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Areawide Environmental Assessment on the Development of a NEPA (National Environmental Policy Act) Compliance Strategy for New Source Coal Mining Activity in the Western Kentucky Coal Field

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NEPA Compliance Section
345 Courtland St., N.E.
Atlanta, GA 30365

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The Western Kentucky Coal Field Areawide Environmental Impact Assessment (EIA) was initiated with the objective of developing a strategy to streamline USEPA's new source NPDES while fulfilling the legislative requirements of the Clean Water Act and NEPA.

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AREAWIDE ENVIRONMENTAL ASSESSMENT ON THE DEVELOPMENT OF A NEPA COMPLIANCE STRATEGY FOR NEW SOURCE COAL MINING ACTIVITY IN THE WESTERN KENTUCKY COAL FIELD

Prepared for:

U.S. Environmental Protection Agency, Region IV
Environmental Assessment Branch
NEPA Compliance Section
345 Courtland Street, N.E.
Atlanta, Georgia 30365

October 31, 1983

EXECUTIVE SUMMARY

1. Background

In accordance with the National Environmental Policy Act (NEPA), the United States Environmental Protection Agency (USEPA) is required to conduct an environmental review prior to the issuance of each New Source National Pollutant Discharge Elimination System (NPDES) permit for coal mining activities in the Western Kentucky Coal Field. In general, a "new source" is a source built or altered after applicable new source performance standards (NSPS) have been set under the authority of Section 306 of the Clean Water Act. NSPS have been established for the coal mining industry, thus mandating environmental reviews by USEPA of all New Source NPDES permit applications.

The Western Kentucky Coal Field Areawide Environmental Impact Assessment (EIA) was initiated with the objective of developing a strategy to streamline USEPA's permit review process while fulfilling the legislative requirements of the Clean Water Act and NEPA. The need to streamline the permit review process arises from the existing large volume and projected increase in coal mining permit applications meeting New Source criteria. USEPA Region IV could be faced with as many as 70 permit applications annually for New Source coal mining activities in the Western Kentucky Coal Field. The financial and human resources necessary to support the responsibility of reviewing these permit applications utilizing standard procedures are not currently available and do not appear likely to be available in the future.

The strategy development process included the following elements:

- Description of the environmental resources of the Western Kentucky Coal Field in order to identify those resources which are sensitive to coal mining activity;
- Description and analysis of the existing and anticipated regulatory framework in western Kentucky regarding coal mining activities in order to determine the regulatory constraints with which a NEPA compliance strategy must comply;
- Identification of those resources sensitive to coal mining which are not protected by the existing regulatory framework in whole or in part;

- Development of generalized NEPA compliance strategies;
- Identification and analysis of the various options which could be incorporated into NEPA compliance strategies including resource threshold criteria and standard mitigating measures in the form of permit conditions for identified sensitive resources;
- Development of specific alternative NEPA compliance strategies; and
- Evaluation of those feasible strategies with regard to level of environmental benefit, USEPA resource requirements, costs to the applicant, time frame, and duplication of effort.

The information presented in this Areawide EIA is supported and supplemented by a Technical Reference Document and environmental baseline data illustrated in a Resource Atlas which consists of quadrangle base maps with overlays that display various environmental resources. The Technical Reference Document and Resource Atlas are available for inspection at the Lands Unsuitable for Mining Program Office, Natural Resources and Environmental Protection Cabinet, Frankfort, Kentucky, and at USEPA Region IV in Atlanta, Georgia.

If additional technical information on surface and underground mining is desired, EPA's Environmental Impact Assessment Guidelines on New Source Surface Coal Mines (EPA-130/6-79-005) and New Source Underground Coal Mines and Coal Cleaning Facilities (EPA-130/6-81-002) should be consulted.

2. Study Area Description

The Western Kentucky Coal Field (Figure 1) encompasses 20 counties and is characterized by rolling terrain and a rural setting. Coal is currently mined in all but seven of the counties. Hopkins, Muhlenberg, Ohio, Union, and Webster Counties are currently the largest producers of coal and are projected to remain so through the end of this century.

The surface water resources of the Coal Field are comprised of three principal watersheds (Tradewater River Basin, Green River Basin, and Ohio River Minor Tributaries Basin) which eventually flow into the Ohio River. Water quality varies across the Coal Field with siltation and acid mine drainage from coal mines identified as the principal sources of pollution. Ground-

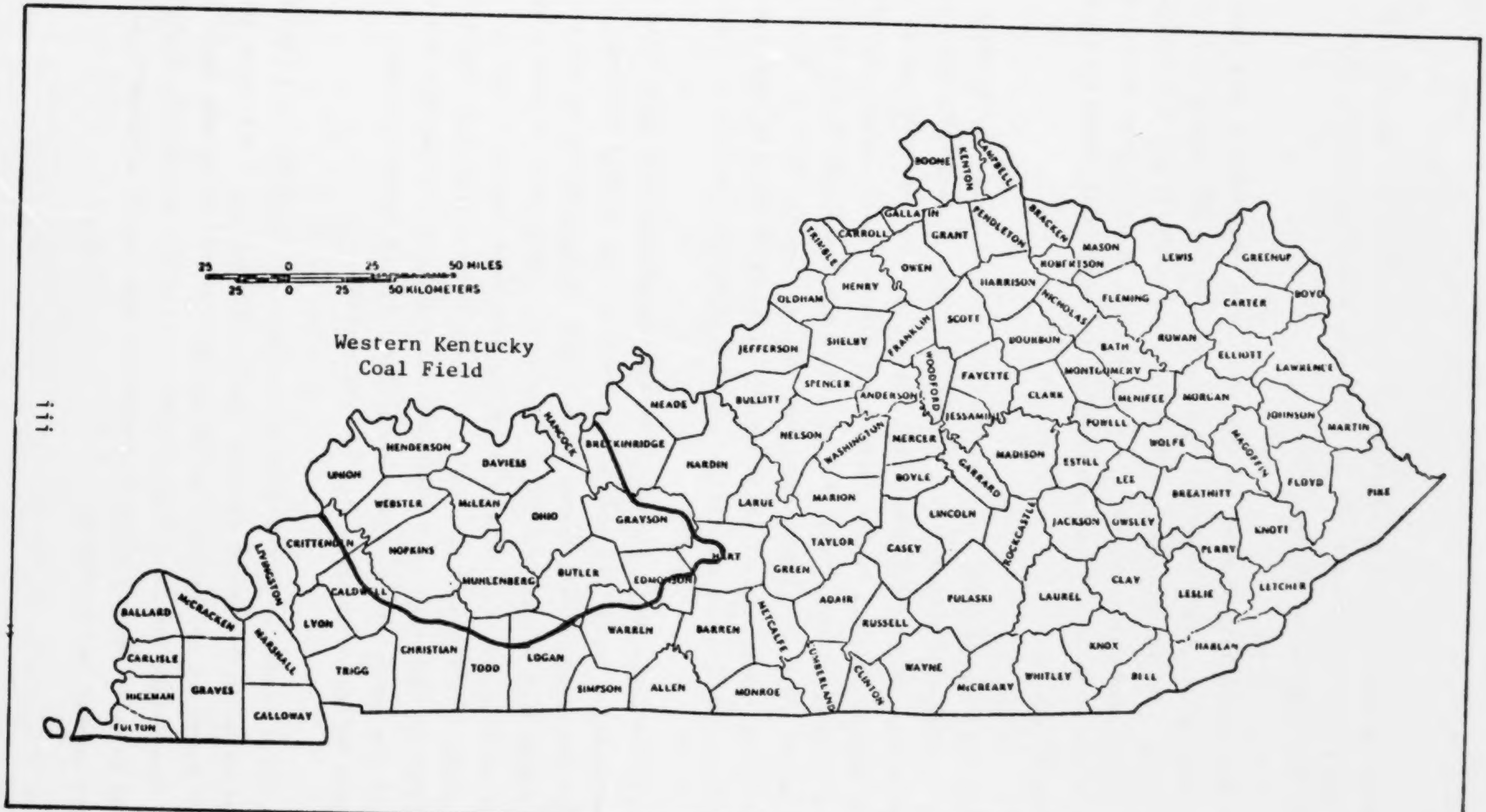

25 0 25 50 MILES
25 0 25 50 KILOMETERS
Western Kentucky
Coal Field
BOONE
KENTON
CAMPBELL
GALLATIN
CARROLL
TRIMBLE
GRANT
PENDLETON
BRACKEN
MASON
LEWIS
GREENUP
BOYD
ROBERTSON
OWEN
HENRY
OLDHAM
HARRISON
NICHOLAS
FLEMING
CARTER
SCOTT
FRANKLIN
SHELBY
JEFFERSON
BOURBON
BATH
ROWAN
ELLIOTT
LAWRENCE
WOODFORD
FAYETTE
MONTGOMERY
SPENCER
ANDERSON
BULLITT
CLARK
MENIFEE
MORGAN
JOHNSON
MARTIN
MEADE
JESSAMINE
POWELL
WOLFE
MAGOFFIN
NELSON
WASHINGTON
MERCER
MADISON
ESTILL
HENDERSON
DAVIESS
HANCOCK
BRECKINRIDGE
HARDIN
BOYLE
GARRARD
LEE
BREATHITT
FLOYD
PIKE
UNION
WEBSTER
McLEAN
LARUE
MARION
LINCOLN
JACKSON
OWSLEY
KNOTT
GRAYSON
OHIO
CRITTENDEN
HOPKINS
HART
TAYLOR
CASEY
PERRY
LIVINGSTON
MUHLENBERG
BUTLER
EDMONSON
GREEN
ROCKCASTLE
CLAY
LETCHER
CALDWELL
ADAIR
PULASKI
LAUREL
LESLIE
BALLARD
McCRACKEN
LYON
WARREN
BARREN
METCALFE
RUSSELL
HARLAN
MARSHALL
CHRISTIAN
TODD
LOGAN
KNOX
CARLISLE
TRIGG
CUMBERLAND
CLINTON
WAYNE
McCREARY
WHITLEY
BELL
HICKMAN
GRAVES
SIMPSON
ALLEN
MONROE
CALLOWAY
FULTON

Figure 1. Outline of the Western Kentucky Coal Field region.

water resources are commonly encountered within the first few tens of feet beneath the ground surface and are the principal source of potable water supply in many regions of the Coal Field.

The biological resources of the Coal Field are comprised of many species of flora and fauna. Approximately 7 species of animals are Federally listed as endangered. The Kentucky Nature Preserves Commission (KNPC) has designated certain environmentally sensitive areas in the Coal Field as High Potential Critical Areas or Known Critical Areas which are especially sensitive to coal mining activities.

Broad expanses of forest and fertile agricultural lands characterize the land use pattern of the Coal Field. Urban land uses are scattered throughout the Coal Field. Coal mining activities are a major economic land use in the southern half of the Coal Field. Prime agricultural land accounts for 41% of the total area of the Coal Field and generally occurs in wide valley bottoms as well as the rolling uplands. Recreational land use in the Coal Field is abundant. Five Federal facilities, eight major State facilities, and other county, local, or private facilities are located within the area or nearby.

Overall socioeconomic conditions in the Western Kentucky Coal Field have improved markedly during the past several years. The renewed interest in coal has initiated almost a full decade of increased employment and population growth within many of the Coal Field counties. A large part of this growth is a result of in-migration. Attracted by the employment opportunities and the higher wages of the coal mining industry, many new and displaced miners and their families have moved into the towns and settlements of western Kentucky. Except in the large cities, coal mining, farming, and timber are the primary and almost exclusive economic base for the region.

Cultural resources in the form of historic, archaeologic, and paleontologic sites occur throughout the Coal Field. Altogether, 1,493 known archaeological sites and 163 historic properties in the Coal Field have been identified. These sites represent only a small portion of the cultural resources that may exist in western Kentucky because of the lack of systematic cultural resource surveys in the region.

The ambient air quality of the Coal Field is generally in compliance with National Ambient Air Quality Standards (NAAQS). The most extensive air pollutant in western Kentucky is particulate matter which is also the major air pollutant emitted from coal mining operations.

Noise levels in the Coal Field are believed to be typical of rural areas. With the increase in coal mining, transportation, and preparation activities, noise levels may become locally intense in some parts of the Coal Field. Coal mining activities are reported to be a major noise source in rural western Kentucky.

3. Adverse Environmental Impacts of Mining Activities

Coal mining activities in the Western Kentucky Coal Field can potentially result in adverse impacts to the environmental resources of the area. Existing State and Federal regulations are designed to eliminate many of the potential impacts resulting from the mining, transportation, and preparation of coal. USEPA has identified specific resources which are not protected from mining-related impacts by existing State or Federal regulations. These resource areas and associated impacts are as follows:

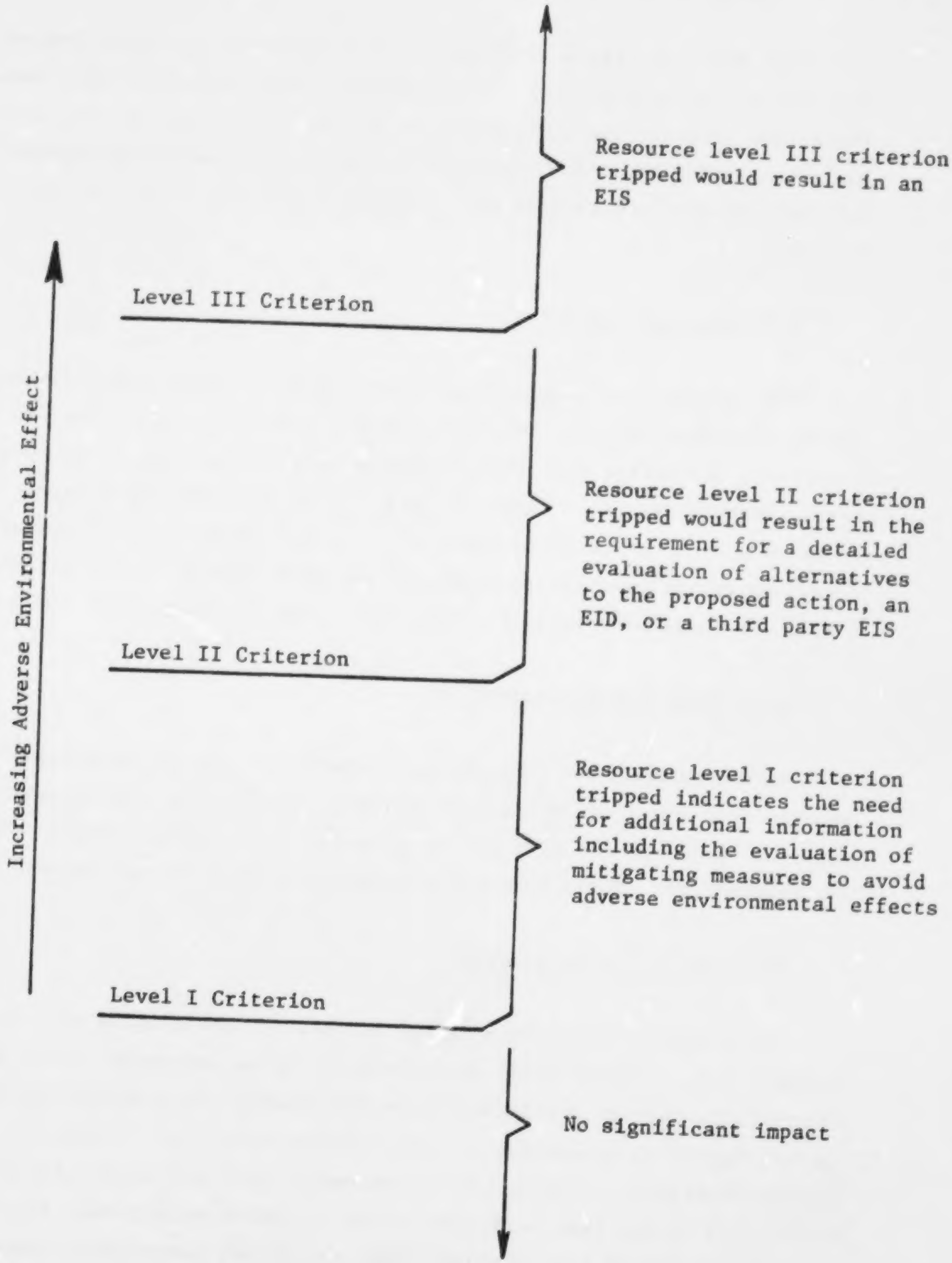
Surface Water and Aquatic Ecosystems (including threatened or endangered species)	Surface disturbances can adversely affect the water quality of sensitive stream segments causing a reduction, alteration in composition, loss of diversity, elimination of certain forms of aquatic life or reduction in water use opportunities for domestic consumption or industrial processes.
Groundwater	Contamination of aquifers by acid mine drainage from underground mines or migration of leachates from coal refuse and storage piles at coal preparation plants and dewatering of underground mines can adversely affect the quality and quantity of water at public and private water supply wells.
Terrestrial Ecosystems (Including threatened or endangered species)	Mining can cause elimination or disturbance of identified sensitive plant and animal habitats, and other identified sensitive areas.
Wetlands	Surface mining can result in the direct removal or elimination of wetlands. The introduction of

	acid mine drainage and sediments into wetlands, changes in the rate and quality of groundwater and surface water inflow, and alteration of soil moisture levels may result in the degradation of wetlands.
Environmentally Significant Agricultural (ESA) Lands	Mining can result in the conversion of prime farmland cultivated less than five of the past ten years, unique farmland, and farmland of statewide or local importance to non-agricultural uses, reducing an economically important resource in western Kentucky.
Recreational Lands	Mining can result in adverse impacts on recreational lands adjacent to mining operations by noise, degraded water, dust, and/or visual effects.
Historic/Archaeological Sites	Mining operations can alter, destroy, or otherwise affect sites that are eligible for inclusion on the National Register of Historic Places.
Air Quality	Coal transportation by haul trucks on unpaved public roads not within the permit area can result in fugitive dust emissions at sensitive receptors, affecting public health and general welfare.
Noise	Mining operations and coal transportation on public and private haul roads can increase ambient noise levels significantly at sensitive receptors located near the operations or along roads with high volumes of coal truck traffic, thereby affecting the public health and general welfare.

4. Resource Threshold Criteria

In order to simplify the review of possible impacts to the environmental resources of the Western Kentucky Coal Field, USEPA developed the concept of Resource Threshold Criteria (RTC). The evaluation of the degree of environmental effect of a proposed mining operation can be measured against the criteria set forth in the RTC. Three basic levels or thresholds (Figure 2) define four categories of environmental effect which result in differing responses by USEPA. Under this concept information needs and permit processing times are dependent upon the significance of impacts caused by the proposed operation. The RTC concept is utilized in several of the NEPA compliance alternatives considered in this document.

Figure 2. The use of Resource Threshold Criteria to determine USEPA permit review actions.


Increasing Adverse Environmental Effect
Resource level III criterion tripped would result in an EIS
Level III Criterion
Resource level II criterion tripped would result in the requirement for a detailed evaluation of alternatives to the proposed action, an EID, or a third party EIS
Level II Criterion
Resource level I criterion tripped indicates the need for additional information including the evaluation of mitigating measures to avoid adverse environmental effects
Level I Criterion
No significant impact

5. NEPA Compliance Alternatives

Five NEPA compliance alternatives were selected for final evaluation in this EIA out of approximately 29 alternatives that were initially developed. These five alternatives include the No Action, Individual Review, Areawide Review, Areawide-Individual Combined Review, and Areawide-Subareawide-Individual Combined Review Alternatives. A general description of each alternative follows.

No Action Alternative

This alternative assumes that USEPA Region IV would avoid making New Source determinations for the coal industry and would entail the use of NEPA compliance activities only when requested by the applicant or an outside party, whether Federal, State, or local. This strategy would result in minimal environmental benefits being realized for the majority of coal operations with some substantial benefits accomplished on those brought to the attention of USEPA. It would also penalize those who sought to comply with the law.

Individual Review Alternative

Procedurally, this alternative is similar to the existing compliance process used for other New Source industry. Individual environmental reviews would be conducted for each of the estimated 70 New Source NPDES coal mining applications with FONSI's or EIS's being prepared on a case-by-case basis.

Areawide Review Alternative

The Areawide Review Alternative assumes the preparation of a Western Kentucky Coal Field Areawide Environmental Impact Assessment (EIA) and that the analysis therein would constitute the substantive analysis for all future actions regarding permitting of coal-related operations. There are three options available to the Agency to implement this type of a strategy. USEPA could: (1) reason that no future action by USEPA would result in significant impacts; (2) reason that although some actions may cause significant impacts, there are no means available to mitigate these impacts; or (3) develop general conditions to be placed on all permits to address the identified significant impact areas.

Areawide-Individual Combined Review Alternative

This alternative combines the latter two approaches into a single strategy and incorporates the Resource Threshold Criteria. The Areawide EIA would be the substantive basis for satisfying USEPA's NEPA responsibility for those New Source coal mining activities which do not create significant adverse environmental impacts (i.e., those which are considered below Level I for each of the Resource Threshold Criteria). Where proposed projects meet Level I, individual environmental reviews would be undertaken. Should significant impacts which are not mitigated be expected from a particular project, an EIS would be prepared.

Areawide-Subareawide-Individual Combined Review Alternative

This alternative is virtually identical to the Areawide-Individual Combined Review Alternative with one additional option. If the region which surrounds a proposed permit area: (1) has similar sensitive resources; (2) is projected to be the focus of intense coal mining interests; or (3) has the potential for significant cumulative impacts on the watershed, USEPA may decide to conduct its own subareawide review prior to permit issuance. This review could ultimately reduce the number of New Sources in the subarea requiring individual analysis by establishing standard mitigative measures for mining activities within its boundaries.

5. Conclusion

Each of the NEPA compliance alternatives and their variations present distinct advantages over the present NEPA compliance process. When analyzed in terms of the level of environmental benefits, manpower requirements, time requirements, financial impacts, and flexibility, however, the Areawide-Subareawide-Individual Combined Review Alternative is the most attractive alternative for meeting USEPA's NEPA requirements. This alternative provides a high level of environmental protection while significantly streamlining the

NEPA review process. A moderate manpower requirement of 0.6 manyears would be required by USEPA to implement the review process. This alternative would also satisfy USEPA's statutory responsibilities and would further represent an innovative approach to NEPA compliance based not only on procedural ease but the ability to effect environmental benefits. The Areawide-Subareawide-Individual Combined Review Alternative is the most flexible alternative available to USEPA because it provides a mechanism to significantly expedite permit processing for the non-environmentally significant mining projects. It also provides a means to focus limited resources on the review of mining projects which demonstrate the greatest potential for significant adverse environmental impacts.

Since the initial writing of this document, several changes have occurred. Kentucky has received primacy for implementation and enforcement of the SMCRA requirements, and delegation of the USEPA NPDES program has been completed. Additionally, there have been several revisions to both the SMCRA regulations and the new source performance standards, some of which are final, and some of which are undergoing litigation in the courts. The Areawide-Subareawide-Individual Combined Review Alternative and the Resource Threshold Criteria were designed to provide the flexibility necessary to consider changes to existing regulations which may affect the level of protection afforded to identified sensitive resources. Thus, although some specific changes are not reflected in this document, provision for their consideration was built into the review strategy.

The environmental review requirements of NEPA apply only to Federal actions. Under delegation of the NPDES program, state-issued permits will not be subject to these requirements. Environmental concerns may be voiced through the public comment period provided at issuance of draft permits, or through the Lands Unsuitable for Mining petition process.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADD	Area Development District
AMD	Acid Mine Drainage
AQCR	Air Quality Control Region
ARC	Appalachian Regional Commission
ARDA	Appalachian Regional Development Act
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BOD	Biochemical Oxygen Demand
BSMRE	Bureau of Surface Mining Reclamation and Enforcement
BTU	British Thermal Unit
^{o}C	degrees Celcius
CAA	Clean Air Act
CEQ	National Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMSHA	Coal Mine Health and Safety Act of 1969
CWA	Clean Water Act
dB	decibels
dBA	the sound level measured in decibels (A-scale)
EIA	Environmental Impact Assessment
EID	Environmental Information Document
EIR	Environmental Information Request
EIS	Environmental Impact Statement
EO	Executive Order (of the President)

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

EPIC	Environmental Photo Interpretation Center
ESA	Environmentally Significant Agricultural land
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Administration
FHA	Federal Housing Administration
FHBM	Flood Hazard Boundary Map
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FONSI	Finding of No Significant Impact
FWPCA	Federal Water Pollution Control Act
gpd	gallons per day
gpm	gallons per minute
HPCA	High Potential Critical Area
KCA	Kentucky Coal Association
KDHR	Kentucky Department for Human Resources
KDLG	Kentucky Department for Local Government
KDMM	Kentucky Department of Mines and Minerals
KDNREP	Kentucky Department for Natural Resources and Environmental Protection
KDOC	Kentucky Department of Commerce
KDP	Kentucky Delphi Process
kg/MT	kilograms per metric ton
km	kilometer
km^2	square kilometers
KNPC	Kentucky Nature Preserves Commission

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

KYGS	Kentucky Geological Survey
Leq	the equivalent energy averaged sound level
m	meter
mgd	million gallons per day
mg/1	milligrams per liter
mi^2	square miles
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSHA	Mine Safety and Health Administration
MT	metric ton
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSPP	New Source Permit Program
NSPS	New Source Performance Standards
ORBES	Ohio River Basin Energy Study
OSA	Office of State Archaeology
POM	Polycyclic Organic Material
ppm	parts per million
PSD	Prevention of Significant Deterioration
RTC	Resource Threshold Criteria
SCMRO	Surface Coal Mining and Reclamation Operation
SCS	Soil Conservation Service, also listed as USDA-SCS

LIST OF ACRONYMS AND ABBREVIATIONS (CONCLUDED)

SHPO	State Historic Preservation Officer
SIP	State Implementation Plans
SMCRA	Surface Mining Control a[illegible] Reclamation Act
SMSA	Standard Metropolitan Statistical Areas
sq mi	square mile
STORET	Storage and Retrieval data base system maintained by EPA
T	Ton
TDS	total dissolved solids
TSP	total suspended particulates
TSS	total suspended solids
USBOM	United States Bureau of Mines
USCOE	United States Corps of Engineers
USDA	United States Department of Agriculture
USDOC	United States Department of Commerce
USDOE	United States Department of Energy
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USHCRS	United States Heritage Conservation and Recreation Service
USHUD	United States Department of Housing and Urban Development
USMSHA	United States Mine Safety and Health Administration, also listed as MSHA
USOSM	United States Office of Surface Mining

LIST OF PREPARERS

USEPA

Mr. Robert Howard	Chief, NEPA Compliance Section
Mr. Richard D. Green	Project Officer, Aug. 78 - Aug. 1979
Ms. Amy Mills	Project Officer, Oct. 1979 to July 1980
Ms. Sally Bethea	Project Officer, April 1981 to Oct. 1981
Ms. Patricia Brooks	Project Officer, Nov. 1981 to Present

WAPORA, Inc.

EIA Chapter 1.0	Mark L. Cameron
2.0	Fred C. Mason, Walker J. Duncan, Kenneth W. Simonton, Mark L. Cameron, Dr. William J. March, David M. Conner, Steven D. Bach, Alyse L. Gardner, Ruthanne L. Mitchell
3.0	Dr. Jan E. Dillard, Jerald D. Hitzemann
4.0	Dr. Jan E. Dillard, Mark L. Cameron
5.0	Dr. Jan E. Dillard, Mark L. Cameron
6.0	Dr. Jan E. Dillard, Mark L. Cameron
Production	Eleanor Clements, Judith Kamen, Alice Hels
Graphics	Ruthanne L. Mitchell
Editing	Wesley Powell

EPIC

Land Use and Land Cover Overlays and Mining Operations Overlays for the Western Kentucky Coal Field Environmental Resource and Mining Atlas

Susan Titus - Project Officer
Jim Simons, Pete Stokely, and Tony Slonecker - Photo Interpretors

Kentucky Nature Preserves Commisssion

Western Kentucky Coal Field: Preliminary Investigations of Natural Features and Cultural Resources

Volume I	Donald F. Harker, Jr., Richard R. Hannan, Melvin L. Warren, Loy R. Phillippe, Keith E. Camburn, Ronald S. Caldwell, Sam M. Coll, Glen J. Tallo, Daniel Van Norman
Volume II	Donald F. Harker, Jr., Thomas C. Barr

Volume III	Donald F. Harker, Jr., Perry B. Wigley, Ronald S. Caldwell
Volume IV	Donald F. Harker, Jr., Glen J. Tallo, Richard R. Hannan
Volume V	Donald F. Harker, Jr. David Van Norman, Sara L. Sanders

1.0 INTRODUCTION

In accordance with the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.), the United States Environmental Protection Agency (USEPA) is required to conduct an environmental review prior to the issuance of New Source National Pollutant Discharge Elimination System (NPDES) permits for coal mining activities in the Western Kentucky Coal Field. In general, a "new source" is a source built or altered after applicable new source performance standards (NSPS) have been set under the authority of Section 306 of the Clean Water Act. As NSPS have been proposed and finalized for the coal mining industry, environmental reviews of all New Source NPDES permit applications by USEPA are mandatory.

The Western Kentucky Coal Field Areawide Environmental Impact Assessment (EIA) was initiated to develop an effective NEPA compliance strategy. The purpose of developing a NEPA compliance strategy is to streamline USEPA's permit review process while still fulfilling the legislative requirements of the Clean Water Act (CWA; 33 USC 1251 et seq.) and NEPA. The need to streamline the permit review process arises from the projected influx of New Source coal mining permit applications during the next twenty years. If, as expected, future market conditions warrant increased coal production, USEPA Region IV will be faced with the responsibility of processing perhaps as many as 70 permit applications per year from the Western Kentucky Coal Field. However, the financial and human resources necessary to support this responsibility using existing procedures are not currently available and do not appear likely to be forthcoming. Consequently, the selected NEPA compliance strategy must simultaneously meet USEPA's environmental review responsibilities while also streamlining the review process in order to minimize time-consuming delays and the commitment of USEPA resources.

In order to achieve these objectives, a process was designed to develop alternative NEPA compliance strategies. This process has included the following elements:

- Description of the environmental resources of the Western Kentucky Coal Field in order to identify those resources which are sensitive to coal mining activity;

- Description and analysis of the existing and anticipated regulatory framework in Kentucky regarding coal mining activities in order to determine the regulatory constraints with which a NEPA compliance strategy must comply;
- Identification of those resources sensitive to coal mining which are not protected by the existing regulatory framework in whole or in part;
- Discussion of generalized NEPA compliance strategies which defined the conceptual basis for individual, subareawide, and areawide strategies;
- Identification and analysis of the various options which could be incorporated into NEPA compliance strategies including resource threshold criteria and standard mitigative measures in the form of permit conditions for identified sensitive resources;
- Development of alternative NEPA compliance strategies which evaluated the options available at each stage as well as the temporal effects in order to define the feasible alternatives for individual, subareawide, areawide, and combined strategies; and
- Detailed description of those feasible strategies which were evaluated in regard to level of environmental benefit, USEPA resource requirements, costs to the applicant, time frame, and duplication of effort.

The information presented in this Areawide EIA is supported and supplemented by a Technical Reference Document and environmental baseline data illustrated in a Resource Atlas which consists of quadrangle basemaps with overlays that display various environmental resources. The Technical Reference Document and Resource Atlas are available for inspection at USEPA Region IV in Atlanta, Georgia, and at the Lands Unsuitable for Mining Program Office, Natural Resources and Environmental Protection Cabinet, Frankfort, Kentucky.

The chapters that follow provide a description of mining activities and the existing condition of the environment, the impacts of mining activities on the environment, and the measures that can be applied to mitigate the environmental impacts of mining activities in the Western Kentucky Coal Field. Also described are the State and Federal regulations that govern mining activities, the alternative NEPA compliance strategies considered by USEPA, and the consequences of implementing the proposed compliance strategy in terms of the level of environmental protection and the cost and time requirements for application preparation and the environmental review of the application.

2.0 ENVIRONMENTAL RESOURCES OF THE WESTERN KENTUCKY COAL FIELD

This chapter presents a brief summary of the principal natural resources and coal mining activities in the Western Kentucky Coal Field. It is included in this EIA to summarize the environmental concerns related to coal mining. These concerns must be addressed by USEPA in order to fulfill the intent of NEPA during the NPDES permitting process. The chapter first describes the present level of mining activity and identifies areas where the potential impacts of mining would occur. In subsequent sections, the water resources, land resources, air quality, aquatic and terrestrial ecosystems, historic and cultural features, and socioeconomic environments of the Western Kentucky Coal Field are described. For additional details, the interested reader is referred to the Technical Reference Document prepared in conjunction with this project.

2.1 COAL RESOURCES AND MINING ACTIVITY

2.1.1 Coal Resources of the Western Kentucky Coal Field

The Western Kentucky Coal Field is an important coal producing region comprising approximately 5,000 square miles in the southeastern tip of the Illinois Basin. The geology and physiography combine to make this area conducive to coal mining. The geologic formations are gently dipping to flat-lying such that the economically important coal beds are extensive in area and thickness. The physiography consists of gently rolling hills which make reclamation easier in western Kentucky than in eastern Kentucky where the terrain is rugged and steep.

Approximately 80 coal beds have been identified in the Illinois Basin. Two of these beds, the Illinois No. 5 and Illinois No. 6 (also known as the Western Kentucky No. 9 or Mulford bed and No. 11 or Herrin bed), account for most of the coal already mined and the remaining reserves. In western Kentucky, 33 coal beds have been identified (Rice et al. 1979). Most of these beds have been given numbers (lowest numbers being the oldest stratigraphically) although some are known by local names. Of the 33 coal beds or zones identified, seven are economically important and contain a majority of the known resources (Smith and Brant 1978). The No. 9 and the No. 11 beds are the most extensive and economically important coal beds in western Kentucky. Both are currently mined in the central part of the Coal Field. The No. 9 bed accounts for approximately 25% of western Kentucky's coal resources (Smith and Brant 1978) and the No. 11 (combined with the No. 12) accounts for approximately 23% of the resources. The No. 12 (Paradise Coal), No. 13 (Baker Coal), and No. 14 (Coiltown Coal) beds which are also found in the central part of the Western Kentucky Coal Field are less extensive than the No. 9 and No. 11 and are of secondary economic importance. In the southern rim of the Coal Field, two additional coal beds are economically important: the Davis Coal (No. 6) and the Mannington Coal (No. 4). These seven coal beds make up approximately 90% of the known reserves in western Kentucky. Twenty-six additional recognized beds constitute the remaining 10% of the known reserves.

According to recent estimates of total coal resources (Smith and Brant 1978), approximately 40.9 billion short tons exist in western Kentucky. This figure is based upon measured, indicated, and inferred resources. Smith and Brant (1978) estimate the remaining resources of the Western Kentucky Coal Field to be about 38.6 billion short tons while the total amount of western Kentucky coal that has been mined or lost is estimated at 2.3 billion short tons.

2.1.2 Mining Activity in the Western Kentucky Coal Field

2.1.2.1 Historical Summary

The earliest commercial mining in the Western Kentucky Coal Field developed prior to the establishment of railroads or effective road transportation. Coal produced from the early mines was generally shipped out by barges on the Green, Tradewater, and Mud Rivers to Henderson, Kentucky and Evansville, Indiana and then shipped to other markets (Pickard 1969). Some coal was also shipped overland by wagon to Russellville, Kentucky. The coal produced during this period was used largely for space heating, the manufacture of salt from brine, and metal working. In fact, the early expansion of activity in the Coal Field was spurred by an abortive attempt to build an iron and steel complex at Airdrie in Muhlenberg County during 1854. This effort brought skilled labor into the area who ultimately ended up mining coal after the complex was abandoned (Pickard 1969). As markets for coal expanded, new mines opened in Breckenridge, Daviess, Hancock, McLean, and Union Counties prior to the Civil War. This growth in coal production ceased during the Civil War when very little coal was produced in the seven-county mining region.

The introduction of rail service into western Kentucky after the Civil War expanded the market for coal especially in the iron and steel industry. By the end of the 19th century, annual coal production in the Western Kentucky Coal Field was nearly 50 times the maximum annual production prior to the Civil War. During the 1900's, production increased until the Depression years (1929-1940) and then decreased. Production increased again after the Depression with sporadic peaks and slumps occurring in the early and late 1950's. The 1960's showed a steady increase, which again became sporadic during the 1970's and remains so at the present time. Most recent production fluctuations reflect increased production of the low sulfur No. 6 coal and a decrease in 1981 as a result of the UMW strike.

2.1.2.2 Current Mining Activity

Coal production in the Western Kentucky Coal field reached its highest level in 1975. Since then, total coal production has fallen from 55.7 million tons in 1975 to 40.9 million tons in 1980, a production decrease of approximately 26% (Table 2.1-1). Ten of the twenty coal-producing counties in the Western Kentucky Coal Field reported decreased production from 1975 to 1980.

Both surface and underground mining production has decreased over the period although surface mining has consistently produced more coal in the Western Kentucky Coal Field than underground mining. Surface mining accounted for approximately 54% to 56% of the total coal production in the Coal Field. Nevertheless, production from surface mines has decreased approximately 10 million tons during the last ten years. The high sulfur content of the coal which has made compliance with air quality regulations more difficult is generally credited for the overall decrease in demand of western Kentucky coal (Thorpe 1980). Surface mining also suffers from two other problems that have contributed to increased production costs: surface mining regulations and the decreased availability of surface minable coals (Greenbaum 1975). Increased

Table 2.1-1. Coal production (in short tons) in the Western Kentucky Coal Field by type and county, 1975 and 1980 (KDMM 1975, 1980).

	1975			1980		
County	Surface	Underground	Total	Surface	Underground	Total
Breckenridge	0	0	0	0	0	0
Butler	698,960	41,772	740,732	1,301,047	11,031	1,312,078
Caldwell	0	0	0	226,082	0	226,082
Christian	199,445	0	199,445	77,640	0	77,640
Crittenden	0	0	0	0	0	0
Daviess	975,582	0	975,582	1,070,478	0	1,070,478
Edmonson	34,555	0	34,555	0	0	0
Grayson	40,292	0	40,292	25,668	0	25,668
Hancock	261,088	0	261,088	33,011	0	33,011
Hart	0	0	0	0	0	0
Henderson	0	1,180,016	1,180,016	0	610,065	610,065
Hopkins	4,341,026	5,448,431	9,789,457	4,850,441	3,615,728	8,466,169
Logan	0	0	0	0	0	0
McLean	855,790	0	855,790	204,420	0	240,420
Muhlenberg	17,273,467	5,196,902	22,470,369	6,825,861	3,618,664	10,444,525
Ohio	6,265,955	3,386,741	9,652,696	5,714,466	1,451,056	7,165,522
Todd	0	0	0	0	0	0
Union	0	7,757,258	7,757,258	113,811	6,262,433	6,376,244
Warren	0	0	0	0	0	0
Webster	261,351	1,746,336	2,007,687	957,366	3,989,180	4,946,546
Total	31,207,511	24,757,456	55,964,967	21,400,291	19,558,157	40,958,448

demand (Fish and Nickel 1975) and technical advances in earthmoving equipment have enabled surface mining to enlarge its share of total coal production (Currens and Smith 1977).

Between 1971 and 1975 underground mining began to regain a portion of its share in production, however. Reported underground production increased from about 15.9 million tons of coal in 1971 to almost 24.8 million tons in 1975, a 36% increase. Production from underground mining increased from 33% to 44% of the total Western Kentucky coal output during this period (Currens and Smith 1977). Since 1975, a decrease has occurred in both underground and surface mining production, with losses of 20% and 25% respectively.

Coal mining activity has historically been concentrated in the southern counties of the Coal Field where the coal was most easily accessible. As indicated in Figure 2.1-1, most mining activity has occurred in Hopkins, Muhlenberg, and Ohio Counties. Most of the Coal Field counties have experienced some level of mining activity in the past.

2.1.2.3 Coal Processing

Most of the coal produced from surface and underground mines includes noncombustible materials such as roof rock and underclay. This run-of-the-mine (ROM) coal usually is cleaned before being shipped to consumers. The cleaning operation generally includes crushing, sizing, wet or dry separation, and drying if wet separation is utilized. Coal cleaning for sulfur reduction is not widely practiced in western Kentucky, but is becoming more feasible with the continued development of the technology. Pyritic sulfur is removed from coal during a wet process that takes advantage of the great difference in their densities. Salable coal is separated from the waste on the basis of differences in density or specific gravity. The waste from wet operations is dewatered in tailings ponds. Wet coal is fed through a thermal dryer and then stored for shipment or loaded directly into waiting coal cars.

Most coal preparation plants are relatively small physically, requiring minimal acreage for facilities exclusive of the spoil sites. The spoil sites may require substantially more area than the plant itself, especially after

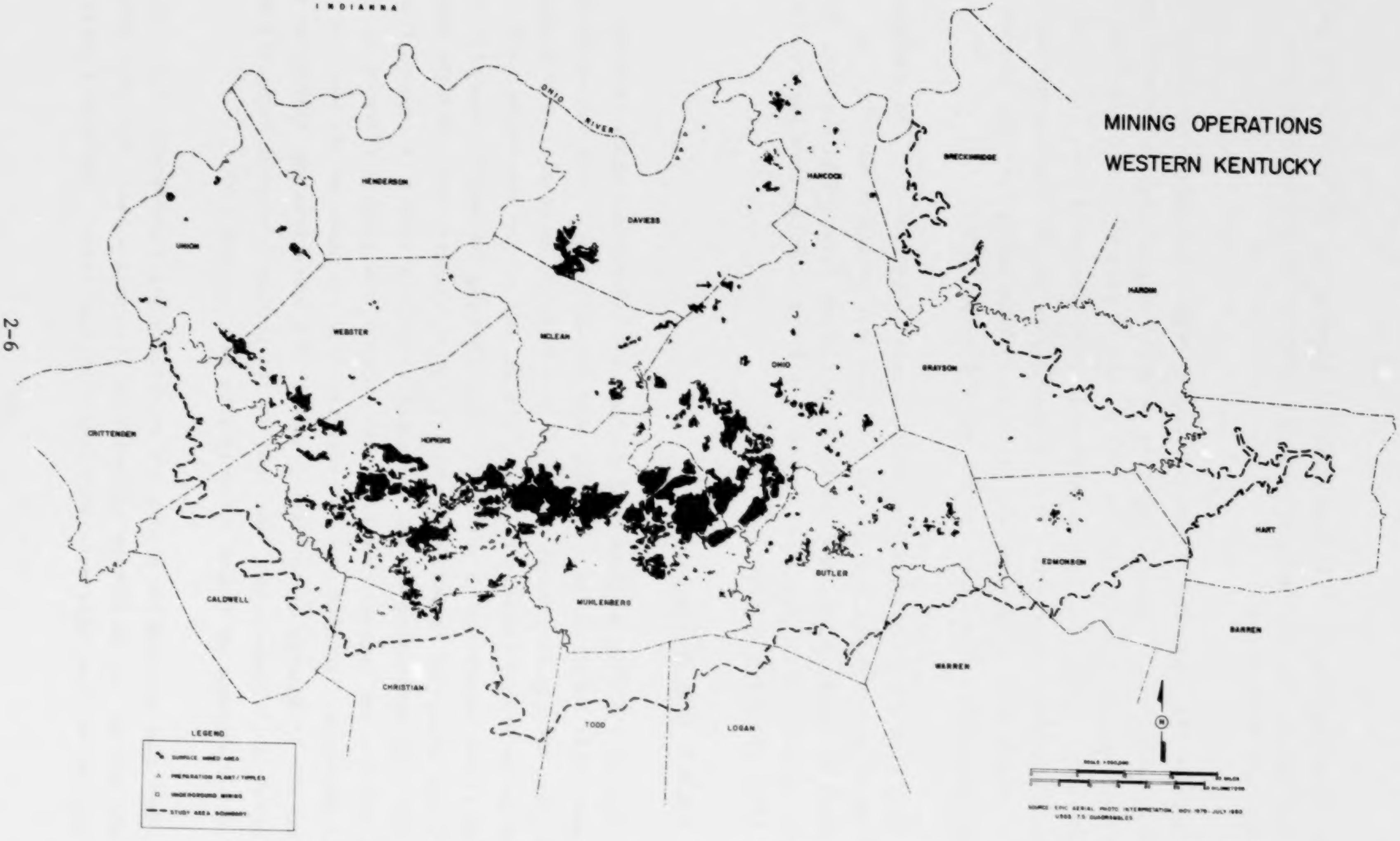
MINING OPERATIONS
WESTERN KENTUCKY
INDIANA
OHIO RIVER
HENDERSON
DAVIESS
HANCOCK
BRECKINRIDGE
UNION
WEBSTER
MCLEAN
OHIO
GRAYSON
HARDIN
CRITTENDEN
HOPKINS
MUHLENBERG
BUTLER
EDMONSON
HART
CALDWELL
CHRISTIAN
TODD
LOGAN
WARREN
BARREN
LEGEND
SURFACE MINED AREA
PREPARATION PLANT / TIPPLES
UNDERGROUND MINING
STUDY AREA BOUNDARY
N
SCALE 1:250,000
MILES
KILOMETERS
SOURCE: EPIC AERIAL PHOTO INTERPRETATION, NOV 1979–JULY 1980
USGS 7.5 QUADRANGLES

Figure 2.1-1. Mining operations in the Western Kentucky Coal Field.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

long periods of operation. Current Federal regulations [Surface Mining Control and Reclamation Act (SMCRA); PL 95-87; 30 USC 1201 et seq.; 30 CFR 700-950] require that spoil piles be constructed outside floodplains and in accordance with proper engineering practice. Toxic materials must be isolated to prevent the long-term formation of a contaminated discharge.

2.1.2.4 Future Mining Activity

Almost all of western Kentucky coal is sold to public utilities for the generation of electricity. Demand for electricity is predicted to be strong well into the future and alternatives to coal for electric generation are not expected to supplant coal until early in the next century. However, environmental concerns limit the use of western Kentucky coal and much of the future demand will depend on whether high sulfur coal can be burned cleanly or whether air quality standards will be relaxed.

Based on current mining trends, coal reserves, and current markets, the future demand for western Kentucky coal appears uncertain. Although significant reserves exist, major technological changes will be required or air quality regulations will need to be relaxed to continue the utility market for western Kentucky coal. Various synfuel projects in Kentucky and the Midwest region may also continue the demand for coal as will foreign markets.

The Oak Ridge National Laboratory (ORNL 1978) projections of western Kentucky coal production indicate no change in the location of mining activity during the remainder of this century. According to these projections, Muhlenberg County should continue to be the major producer of coal with Hopkins, Ohio, Union, and Webster Counties following.

Based on the quantity and type of coal reserves remaining in the Western Kentucky Coal Field, underground mining methods will be utilized more frequently in the future. Four counties in the Coal Field (Muhlenberg, Ohio, Hopkins, and Webster) will deplete their remaining surface mineable coal reserves before the end of this century if recent (1980) production rates are maintained. Muhlenberg County will deplete the surface mineable resources before 1990 if current surface production continues, whereas the latter three counties' surface resources should last until the mid-to-late 1990's.

2.2 WATER RESOURCES

2.2.1 Surface Water

The surface water resources of the Western Kentucky Coal Field are comprised of: (1) the Green River Basin; (2) the Tradewater River Basin; and (3) minor tributaries to the Ohio River (Figure 2.2-1). Surface mining activities affect the hydrology of the area by causing ponding, by altering small drainage divides, and by causing a reduction in water quality. Most of the surface mining activity in the Western Kentucky Coal Field is taking place in the Tradewater River Basin.

The potential for the reduction of water quality in the Western Kentucky Coal Field is significant. The major water quality concerns are high iron and manganese concentrations. The erosion of exposed soil, waste piles, and coal storage piles and overflows from sedimentation ponds during extreme storm events result in the release and transport of sediments, toxic substances, and other water quality reducing elements to western Kentucky streams. Water quality data indicate that unreclaimed, orphaned lands are major contributors to the region's low water quality. As indicated in Figure 2.2-2, large areas of the Coal Field are water quality limited. Streams in these regions (particularly in the Tradewater River Basin) are not able to assimilate pollutants as well as areas without such orphaned lands. Acid drainage problems from abandoned mines currently exist in both the Tradewater River Basin and the Green River Basin. Also, inadequate site development, mine preparation, and poor mining practices may lead to severe soil erosion resulting in annual sediment yields of up to 30 tons per acre. Surface mining activities in the Western Kentucky Coal Field also affect the area's hydrology by reducing peak flood flows and by increasing base flows. The flow modification has been most pronounced in the Tradewater River Basin where most of the surface mining activity currently is taking place.

The areas of concern in protecting surface water resources include water supply, floodplains, water quality, and other water uses including recreation. These concerns are addressed in detail in the Technical Reference Document and are summarized briefly below:

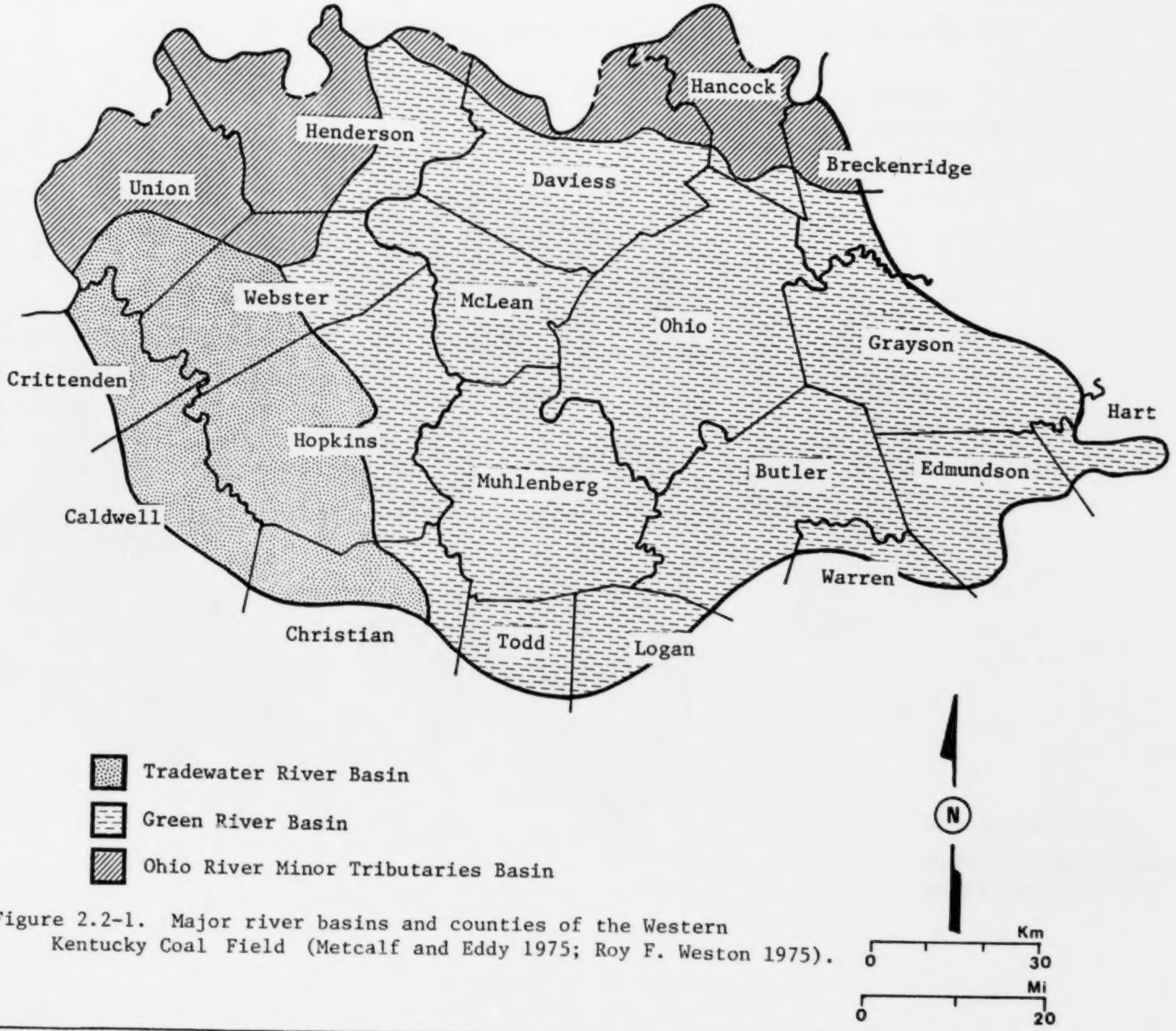

Union
Henderson
Daviess
Hancock
Breckenridge
Webster
McLean
Ohio
Grayson
Crittenden
Hart
Hopkins
Muhlenberg
Butler
Edmundson
Caldwell
Warren
Christian
Todd
Logan
▨ Tradewater River Basin
▤ Green River Basin
▧ Ohio River Minor Tributaries Basin
N
Km
0
30
Mi
0
20

Figure 2.2-1. Major river basins and counties of the Western Kentucky Coal Field (Metcalf and Eddy 1975; Roy F. Weston 1975).

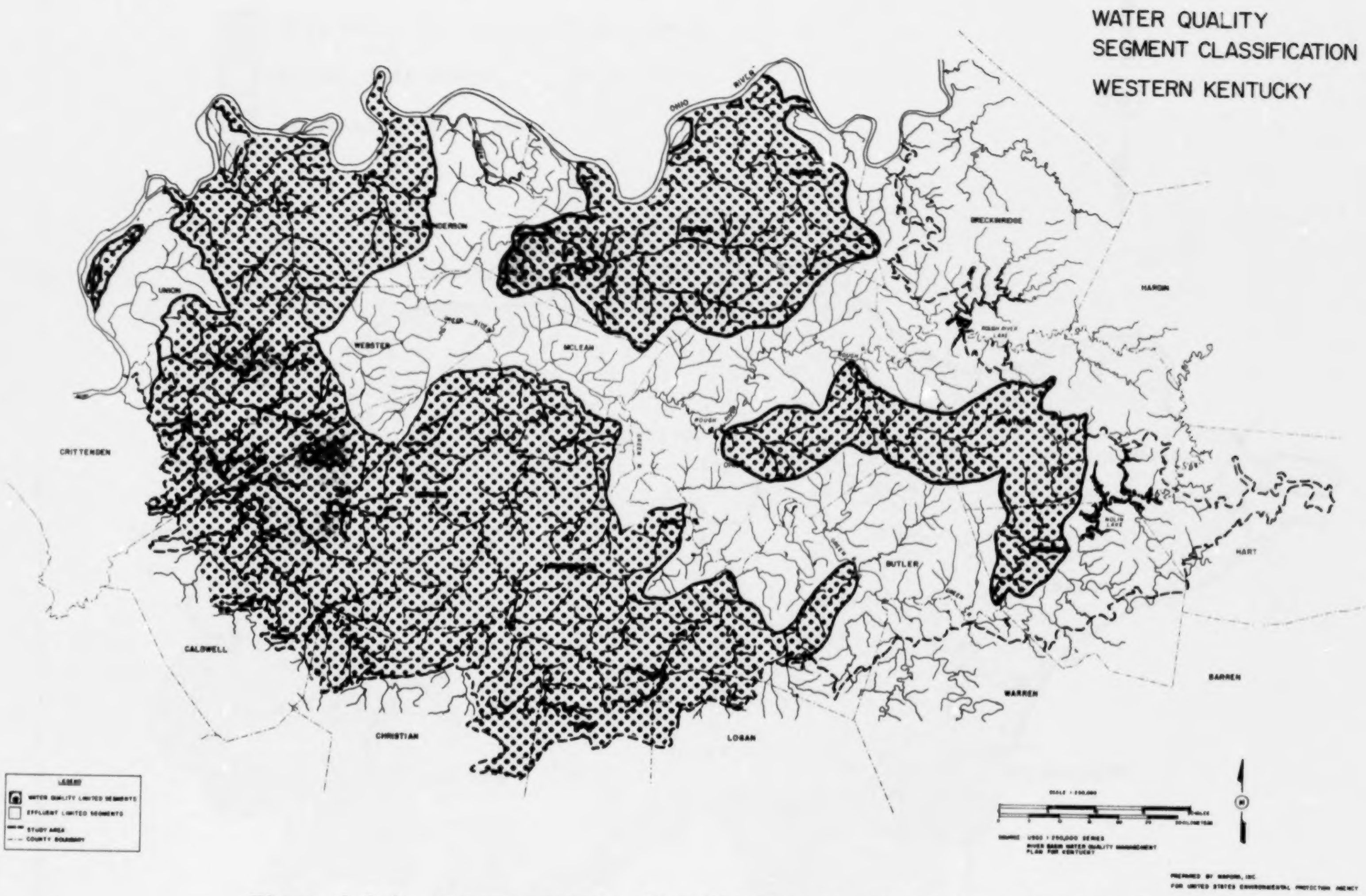

WATER QUALITY
SEGMENT CLASSIFICATION
WESTERN KENTUCKY
OHIO RIVER
GREEN R.
ROUGH R.
ROUGH RIVER LAKE
NOLIN LAKE
BRECKINRIDGE
HARDIN
HART
BARREN
WARREN
BUTLER
LOGAN
CHRISTIAN
CALDWELL
CRITTENDEN
UNION
HENDERSON
WEBSTER
MCLEAN
LEGEND
WATER QUALITY LIMITED SEGMENTS
EFFLUENT LIMITED SEGMENTS
STUDY AREA
COUNTY BOUNDARY
SCALE 1:250,000
MILES
KILOMETERS
SOURCE: USGS 1:250,000 SERIES
RIVER BASIN WATER QUALITY MANAGEMENT PLAN FOR KENTUCKY
FOR UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Figure 2.2-2. Stream segment classifications in the Western Kentucky Coal Field.

- Water Supply. The primary concern with water supply is to maintain the integrity of the supply source and to minimize the risk of its contamination. To accomplish this, the watersheds above water supply withdrawal points must be protected including both streams and impoundments.

- Floodplains. Protecting floodplains from encroachment and maintaining floodplain storage capacity are the major concerns.

- Water Quality. Water quality problems are of primary concern where surface mining activities are undertaken. Much of the poor water quality in the Western Kentucky Coal Field, especially in the Tradewater River Basin, can be traced to lands which were mined and abandoned before current surface mining reclamation requirements were established. These orphaned lands are testimony to the potential for environmental degradation caused by strip-mining activities.

- Water Use Concerns. Protection of other water use concerns is designed to preserve the natural balance of an area and to provide continuing recreational value to the people.

2.2.2 Groundwater

The groundwater table of the Western Kentucky Coal Field is usually encountered within the first few tens of feet beneath the ground surface. The chemical composition of the groundwater in this area is variable, however. The major objectionable chemical constituents of groundwater in the Western Kentucky Coal Field are iron, chloride, and hardness. Locally, the occurrence of acidity, sulfate, nitrate, and fluoride has been reported to cause groundwater problems. The primary sources of iron and chloride are saline water and acid mine drainage.

Saline water in some areas of the Western Kentucky Coal Field is responsible for high chloride concentrations in groundwater obtained from Pennsylvanian and Mississippian rocks. Nevertheless, throughout most of the Coal Field the fresh-saline water interface is more than 200 feet below the surface.

Acid mine drainage (AMD) is the principal water quality problem associated with coal mining in the region. It is dependent upon the following conditions (Appalachian Regional Commission 1969):

- The availability of air, water, and iron disulfide minerals and the length of time water is in contact with the minerals;
- Hydrologic, geologic, and topographic features of the surrounding terrain and the placement of the mine with respect to them;
- The type of mining method employed and whether the mine is operationally active or inactive; and
- The influence of micro-organisms on pyrite oxidation.

Many surface streams in the Western Kentucky Coal Field are naturally acidic. It is therefore very likely that the groundwater in some areas is also naturally acidic and may thus contain high concentrations of objectionable metals. Coal mining activities in these areas cause a greater increase in the rate of exposure of acid-producing materials which in turn may increase the rate of AMD production. In areas where groundwater is naturally acidic, pathways of contaminated water migration have most likely already been established.

2.3 LAND RESOURCES

2.3.1 Land Use

The Western Kentucky Coal Field encompasses all or portions of 20 counties and covers about 5,000 square miles of land area or approximately 12% of the total area of Kentucky. The most economically important land resources that occur within the Coal Field are broad, fertile agricultural lands, forested lands, and coal-bearing lands. Overall, the character of the Western Kentucky Coal Field is one of a rural, earth-resource oriented region with farming and forestry comprising the vast majority of the land uses. Figure 2.3-1 indicates the general pattern of land uses in the Coal Field.

Agricultural land in the Western Kentucky Coal Field totals 3,998,500 acres or about 75% of the land in the study area. Silviculture accounts for approximately 2,196,200 acres within the Coal Field and six counties of the study area contain 40% to 50% of the commercial forest land. Mining activities do not account for significant areas of land in the Western Kentucky Coal Field when compared to agriculture or silviculture. However, large areas of

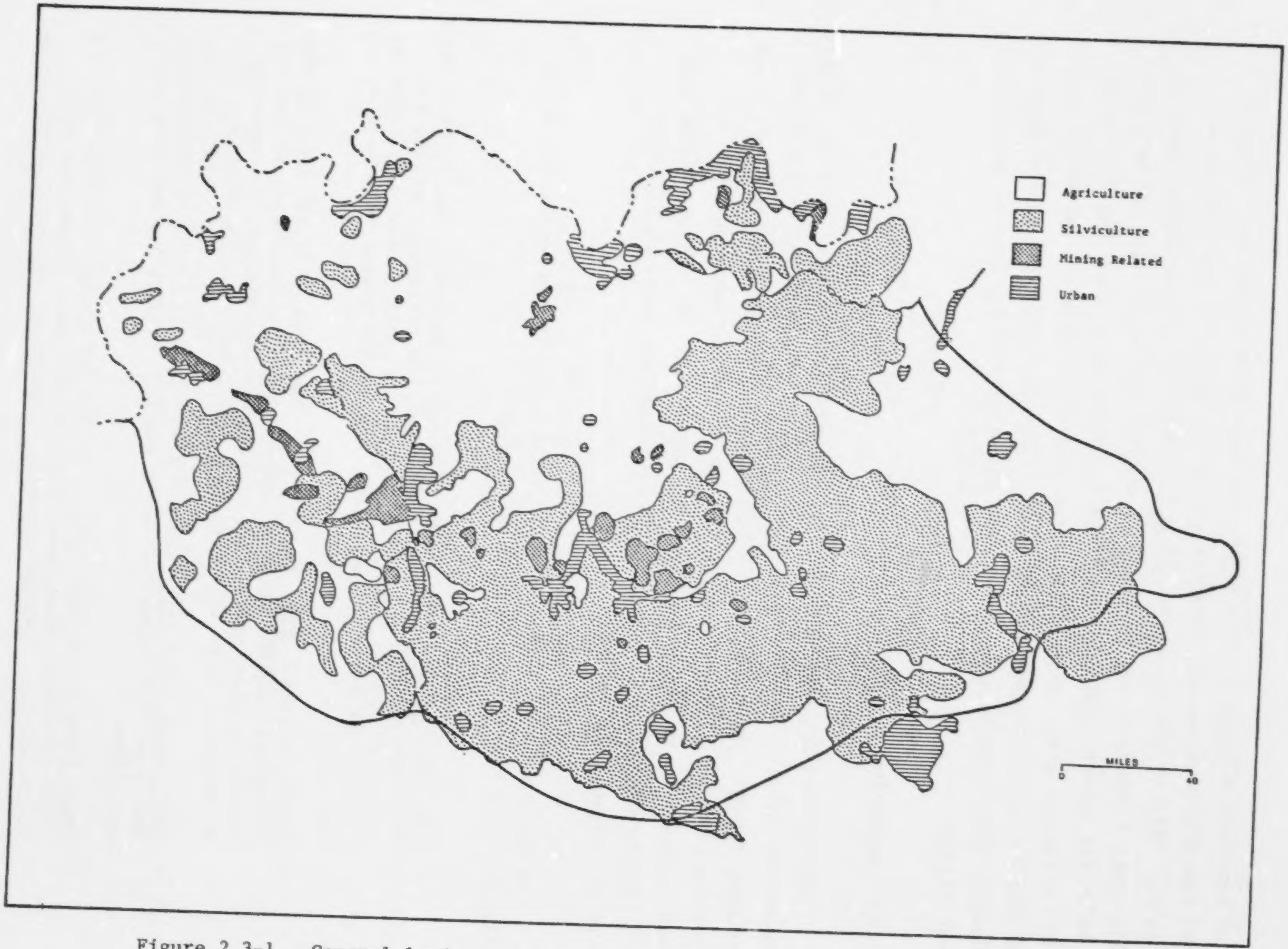

Agriculture
Silviculture
Mining Related
Urban
MILES
0
40

Figure 2.3-1. General land use pattern of the Western Kentucky Coal Field (Metcalf and Eddy, Inc. 1975; Roy F. Weston, Inc. 1975).

land have been affected by coal mining and associated activities. Slightly more than 87,000 acres are currently covered by active or inactive mining permits. Only 27,139 acres are currently subject to surface mining, however, while only 3,324 acres are subject to underground mining. Much of the urban land in the Western Kentucky Coal Field is concentrated along the Ohio River. The two largest urban concentrations are located in Owensboro and Henderson. In contrast to the Eastern Kentucky Coal Field, the urban land of the Western Kentucky Coal Field is much more evenly distributed in the form of small towns and villages.

2.3.2 Recreation Areas

The Western Kentucky Coal Field is situated in an area of abundant natural resources and recreational attractions of regional and national significance (Figure 2.3-2). There are over 71,500 acres of State and local recreation and hunting lands in the study area as well as rivers, streams, and lakes for recreational use by the residents of the Coal Field. No Federal recreational facilities exist within the Coal Field, but many are located within easy driving distance of the area.

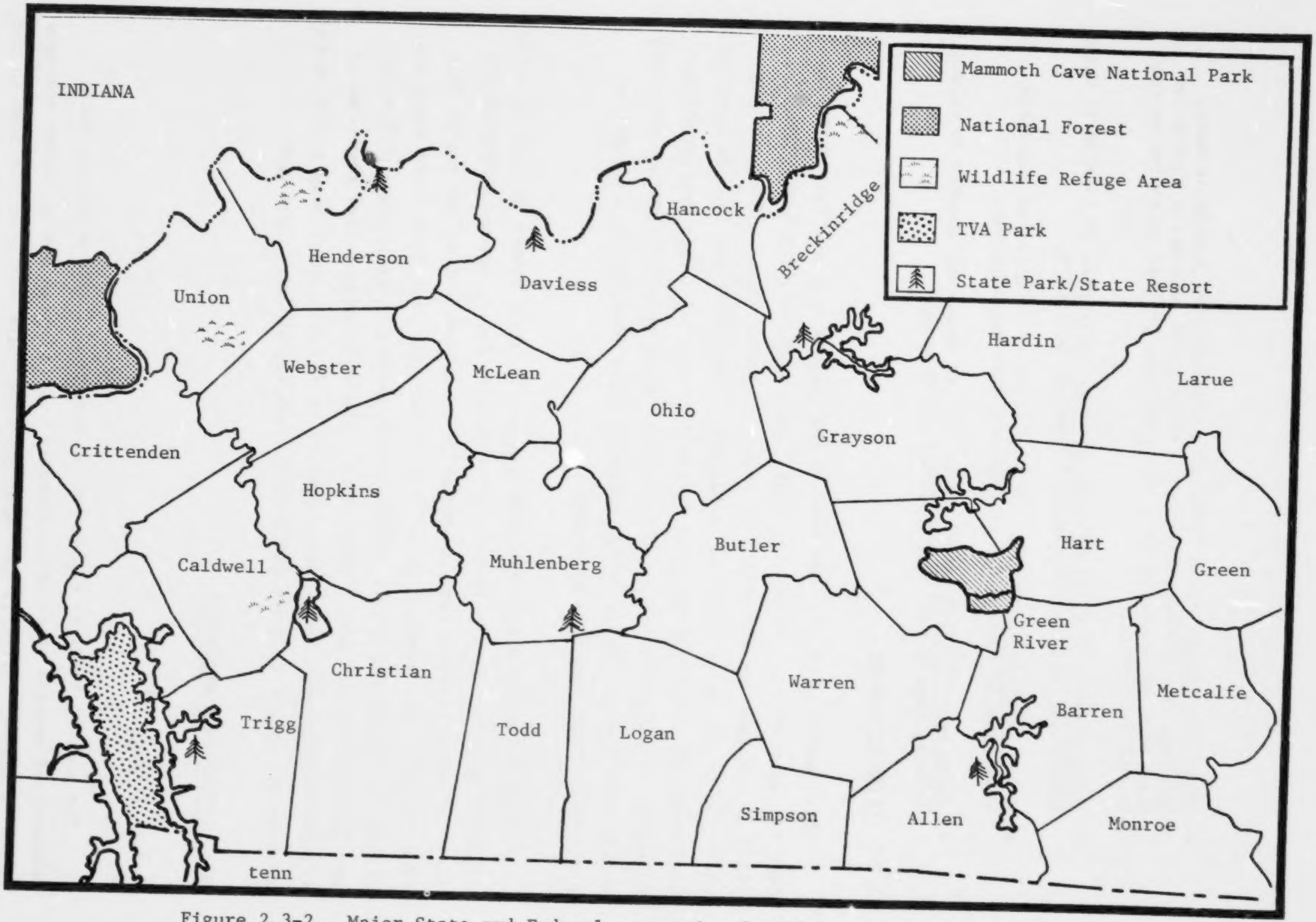
Eight major State recreational facilities are located within the Western Kentucky Coal Field. These facilities include:

- John James Audubon State Park. Located in Henderson County, this park is a memorial to the famous naturalist, ornithologist, artist, and natural scientist. In addition to nature trails, camping, picnicking, fishing, and swimming facilities, the Audubon Museum is located at this Park.

- Pennyrile Forest State Resort Park. Comprised of 13,440 acres of land in Caldwell and Christian Counties, recreation facilities offered here include camping, picnicking, hiking, boating, fishing, and swimming. In addition, there is a lodge and cabins for overnight visitors.

- Lake Malone State Park. This 338 acre park is located in Muhlenberg County on Lake Malone and offers camping, picnicking, and water sports activities.

- Rough River State Resort Park. Located in Breckenridge County on the 2,180 acre Rough River Lake, this 377 acre park offers overnight accommodations, camping, swimming, picnicking, and boating facilities.



▨ Mammoth Cave National Park
▨ National Forest
Wildlife Refuge Area
TVA Park
State Park/State Resort
INDIANA
Union
Henderson
Daviess
Hancock
Breckinridge
Hardin
Larue
Webster
McLean
Ohio
Grayson
Crittenden
Hopkins
Muhlenberg
Butler
Hart
Green
Caldwell
Green River
Christian
Trigg
Todd
Logan
Warren
Barren
Metcalfe
Simpson
Allen
Monroe
tenn

Figure 2.3-2. Major State and Federal recreation facilities in or near the Western Kentucky Coal Field.

- Nolin River Lake. This 2,890 acre reservoir is located in Hart, Grayson, and Edmonson Counties. Although no recreation facilities have been developed to date, the Lake does provide potential recreational activities.

- Higgins-Henry Wildlife Management Area. This area is located in Union County and provides hunting and fishing facilities.

- Green River Scenic River. This consists of 25 miles of protected river that flows through the Mammoth Cave National Park.

- Jones Keeny Wildlife Area. This hunting preserve, located in Caldwell County, consists of approximately 1,600 acres.

2.3.3 Prime Farmlands

Three-quarters of the land area in the Western Kentucky Coal Field is used for agriculture. Within the Coal Field, approximately 2,323,700 acres (41%) of the land are classified as prime farmland. This land constitutes about 39% of all prime farmland in Kentucky. An additional 196,284 acres of land could be classified as prime farmland if drained and/or protected from flooding. Table 2.3-1 indicates the areal extent of prime farmland by county in the Coal Field. Figure 2.3-3 indicates prime farmland as a percent of total Coal Field land area by county.

Prime farmland acreage has been reduced by urban growth as well as other competitive uses. In the Western Kentucky Coal Field, approximately 20,000 acres of prime farmland were converted to urban uses during the period from 1969 to 1979. The average income from Western Kentucky Coal Field farms was $22,641 or $2,326 per acre compared to the overall State average of $16,740 per farm of $122 per acre (USDOC 1980). The agricultural land resources of the Western Kentucky Coal Field appear to be of great importance to the State's economy and should be protected from degradation by other land uses.

2.4 ATMOSPHERIC RESOURCES

2.4.1 Climate

The western Kentucky region has a temperate climate with hot, humid summers and winters which are moderately cold. Annual precipitation averages about 44 inches. Slightly more precipitation falls during spring than in the

Table 2.3-1. Prime farmland acreage by county in the Western Kentucky Coal Field (USDA 1980).

County	Total Land Area	Prime Farmland	% of Total	Additional Prime Farmland**	Prime Farmland Lost to Urban Growth, 1969-1979
Breckinridge*	361,116	87,029	24.1	700	400
Butler*	283,158	71,639	25.3	9,835	100
Caldwell*	228,774	93,340	40.8	5,222	100
Christian*	464,593	205,350	44.2	22,530	5,000
Crittenden*	233,276	77,681	33.3	16,824	100
Daviess	295,898	168,070	56.8	19,000	3,000
Edmonson*	194,823	38,575	19.8	1,500	200
Grayson*	317,954	96,340	30.3	11,700	1,000
Hancock	119,718	42,500	35.5	1,660	50
Hart*	272,080	50,879	18.7	450	1,800
Henderson	277,398	186,134	67.1	18,500	1,900
Hopkins	353,820	157,450	44.5	15,000	1,125
Logan*	360,026	190,814	53.0	11,200	620
McLean	164,519	114,670	69.7	2,500	20
Muhlenberg	307,089	89,670	29.2	32,250	750
Ohio	381,091	133,382	35.0	14,570	21
Todd*	240,453	128,402	53.4	0	12
Union	217,888	143,370	65.8	3,000	30
Warren*	349,489	123,719	35.4	5,143	3,500
Webster	216,850	124,689	57.5	4,700	100
Total	5,640,013	2,323,703	41.0%	196,284	19,828

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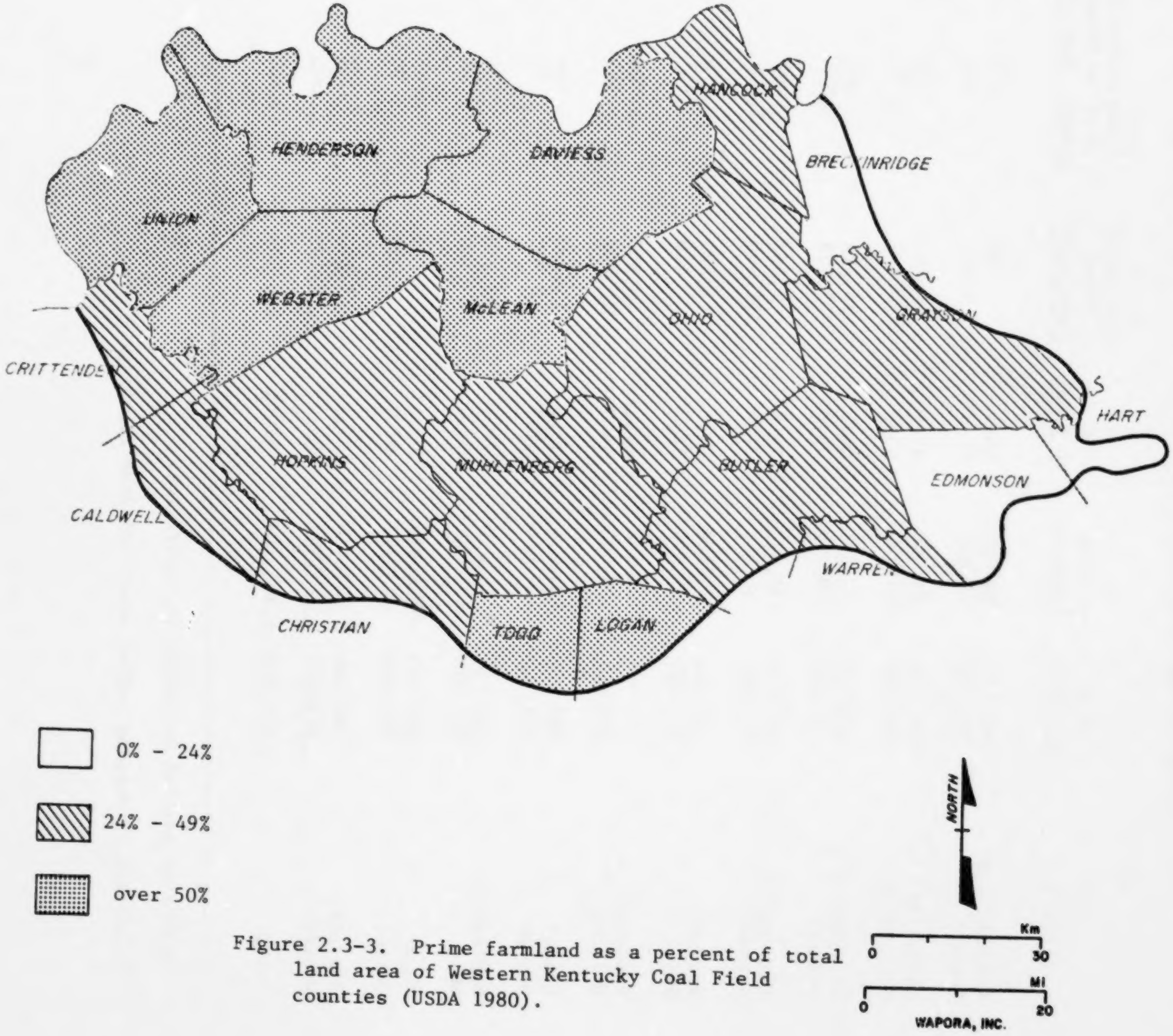
*Indicates partial inclusion in study area.

**Available if drained and/or protected from flooding.



HANCOCK
BRECKINRIDGE
HENDERSON
DAVIESS
UNION
WEBSTER
McLEAN
OHIO
GRAYSON
CRITTENDEN
HOPKINS
MUHLENBERG
BUTLER
HART
EDMONSON
CALDWELL
WARREN
CHRISTIAN
TODD
LOGAN
0% - 24%
24% - 49%
over 50%
NORTH
Km
0
30
Mi
0
20
WAPORA, INC.

Figure 2.3-3. Prime farmland as a percent of total land area of Western Kentucky Coal Field counties (USDA 1980).

other seasons. Thunderstorms are common from March through September. Spring thunderstorms usually accompany cold fronts moving rapidly through the area while summer thunderstorms are usually slow moving, locally intense events which may bring three or more inches of rain. Approximately 50% to 60% of the precipitation that falls on the Coal Field returns to the atmosphere through the process of evapotranspiration or enters the groundwater system. The remaining 40% to 50% leaves as surface runoff.

Streamflow normally is highest in the spring and lowest during the late summer and autumn. Although the topography is relatively flat, the land generally is not urbanized and local flooding is not a major problem during summer thunderstorms. In small, heavily disturbed (e.g., strip-mined) watersheds, however, the potential for local flooding does exist.

2.4.2 Air Quality

The major air pollutant emission from coal mining activities in the Western Kentucky Coal Field is fugitive dust. Other pollutants are emitted into the atmosphere during coal mining but not in significant amounts. Ambient air quality in most parts of the Coal Field is in compliance with the National Ambient Air Quality Standards (NAAQS) for total suspended particulates (TSP), sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, and ozone, although some non-attainment areas have been designated for TSP. The primary concern regarding the impact of coal mining on air quality in western Kentucky is the effect of particulate matter emitted from coal mining operations.

Various factors affect the amount of fugitive dust emissions from coal mining, preparation, and transportation. These factors include the method of mining, the type of equipment used, climatic conditions, and transportation method. Mining coal by surface methods produces greater amounts of fugitive dust emissions than underground mining because larger areas of disturbed land are exposed to the air. Dust emissions are produced during drilling, blasting, overburden removal, coal removal, and material loading and transfer operations during surface mining. Coal preparation plants produce fugitive dust emissions at conveyor system transfer points, load-in and load-out operations, storage pile maintenance, and wind erosion on storage piles. The transportation of coal, particularly by haul trucks on unpaved haul roads, can result in emissions of fugitive dust over wide areas.

No Class I air quality areas have been designated within the Western Kentucky Coal Field. However, the Mammoth Cave National Park, a designated Class I area, is located just outside the Coal Field in Edmonson County. Class I areas are so designated because of their pristine air quality. All other areas are designated Class II which indicates moderate industrial activity. Class III areas have inferior ambient air quality. There are no designated Class III areas in the Western Kentucky Coal Field.

2.4.3 Sound Quality

The existing noise environment of western Kentucky includes both urban and rural noise. The urban noise environment is complex and consists of many factors. Typically, noise intrusions occur from surface transportation, air transportation, industry, construction, and animals. In general, urban noise is a function of city size and density (USEPA 1974); as these factors increase, noise levels increase. A study of environmental noise in 20 Kentucky communities revealed that transportation sources constitute the primary source of noise intrusion in each community (Watkins and Associates 1979). Based on the results of this study and a USEPA study (NRC 1977), a day/night noise level (L_{dn}) of 60 dBA appears to be representative of the average urban environment. This value should be considered a reference value only and impact assessment should be based on site-specific data gathered at the time of the environmental assessment.

Few data are available concerning the rural noise environment. This can be attributed to the low noise levels associated with rural areas which cause little concern to those residing there. The quietness of rural areas, however, makes these areas especially sensitive to noise intrusions. Thus, industrial or commercial site selection for rural areas is often more critical than that for urban areas. Based on limited typical information and the findings of the National Research Council, a typical outdoor ambient L_{dn} noise level of 45 dBA is assumed to be representative of rural areas in western Kentucky. In general, the identification of typical noise levels in the rural environment is less difficult than in the complex urban environment because the types and likelihood of noise intrusion are limited.

Noise levels for a variety of activities associated with both surface and underground methods of mining are presented in Table 2.4-1. Major noise producing equipment used in surface mining operations typically consist of a dragline, front loaders, blasting, tractors, haul trucks, scrapers, backhoes, and water trucks. The operation of these pieces of equipment generally is spread out over a relatively large area with little cumulative effect. Underground mining operations have slightly different noise characteristics than surface mines. Major sources of noise in underground mining activities consist of the mine vent fan, front loaders, haul trucks, and water trucks. Another source of noise associated with mining operations is haul roads. Unlike the noise from the mining operation which is assumed to radiate from the center, the noise from haul roads is assumed to travel outward parallel to the road. In addition to haul roads, many mining operations are also served by rail. Although noise from railroad operations is generally not as frequent as the other types of noise, the events may be considered very intrusive.

Table 2.4-1. Noise levels produced by coal mining equipment at 100 feet (USGS 1976; USEPA 1971; Watkins and Associates 1979).

Equipment	Sound Level (dBA)
Dragline	74
100 ton truck (loaded)	70
Tractor	72
Water Truck	65
Scraper	67
Front loader	73
Backhoe	71
Mine vent fan	77

Historically, the mining and preparation of coal from surface and underground mines in western Kentucky has resulted in a degradation of the noise environment adjacent to the mine sites. The noise effects of the coal mining operation are geographically small, affecting only receptors immediately adjacent to the mining site. Only mines which are extremely close to each other result in cumulative or synergistic noise impacts. However, as the number of mines increases in western Kentucky, the total area of noise impact will grow. It logically follows that the total number of affected receptors will also increase.

2.5 BIOLOGICAL RESOURCES

The assessment of existing biological resources in the Western Kentucky Coal Field is based on a synthesis and incorporation of studies conducted by the Kentucky Nature Preserves Commission (KNPC 1980 a through f). The biological resources addressed in this discussion include the terrestrial flora and fauna of the Coal Field as well as the aquatic animals of the streams and wetland areas.

2.5.1 Terrestrial Flora

The Western Kentucky Coal Field is located in the Shawnee Hills Section of the Interior Low Plateaus Physiographic Province. The major types of plant communities include upland forests, prairies, and bottomland forests. The area is considered to be a broad transition zone where local climatic, topographic, and edaphic factors have distributed species of similar ecological tolerances into a mosaic of vegetation types (Braun 1950). No single climax or combination of dominants characterizes the forests of this region.

The bottomland forests occupying the alluvial plain of the Mississippi River and lower portions of the Ohio, Wabash, Green, and Tradewater Rivers have been found to be floristically uniform throughout (Braun 1950). Because of this uniformity, these bottomland forests in Kentucky are considered to be extensions of the Southeastern Evergreen Forest Region into the Western Mesophytic Forest Region. The forests of this transition region are generally less luxuriant than those of the Mixed Mesophytic Forest Region. Although a mixed forest, there is a tendency in the Western Mesophytic Forest Region for the concentration of dominance by a few species. While mixed mesophytic communities may be found in localized habitats, there is a greater frequency of oak dominated communities. Extensive swamp forests occupy the broad alluvial valleys of major rivers. The greater degree of agricultural utilization of this region, as compared with that of the Mixed Mesophytic Forest Region, has resulted in a much more fragmentary forest vegetation. It has been estimated that 31% (260,970 ha) of the area remains forested (KNPC 1980a). Those areas which remain forested have periodically been subjected to lumbering and other disburbances which have altered their composition and structure.

The upland forests are located on the western lobe of the Shawnee Hills section which includes a circular area of rolling plateau. A similarity has been noted between the woody species of the Western Kentucky Coal Field and the surrounding sections of the Interior Low Plateaus as well as the Appalachian Plateaus. The Coal Field also resembles the Mississippi Embayment (East Gulf Coastal Plain) of Kentucky which is attributable to the species typical of southern floodplain forests found in the extensive bottomlands of both areas. Secondary oak and/or oak-hickory forests dominate the rolling plateau. The vegetation of the upland forests of the Mammoth Cave area includes the Quercus alba - Quercus velutina - Liriodendron tulipifera (white oak-black oak-tulip poplar) communities. Similar Quercus spp. - Liriodendron tulipifera forests were found where valleys were less deeply cut into the upland.

The prairie is a vegetational type that has received little scientific attention in Kentucky (Bryant 1977). The Western Kentucky Coal Field, while outside of the interpreted extent of the original boundaries of the Barrens of Kentucky, does include a few isolated remnant outliers of this type of vegetation. These outliers add to the vegetational diversity of the Coal Field region and further increase the transitional aspect of the Western Mesophytic Forest Region.

The flora of the Western Kentucky Coal Field within the Western Mesophytic Forest Region has a notable lack of endemics and may be best thought of as a mixing zone. This area does not have a unique flora of its own. The rich mesic gorges of the uplands in the Western Kentucky Coal Field have numerous affinities with the flora of the Mixed Mesophytic Forest Region. The wetlands of the Western Kentucky Coal Field are similar to the wetlands of the Coastal Plain and are a part of the Mississippi Alluvial Plain of the Southeastern Evergreen Forest Region. This similarity is expressed by the flora and vegetation of these wetlands. An understanding of the mixing of floristic regions enables one to better realize the importance of this area as an extended and/or isolated gene pool of numerous Mixed Mesophytic Forest species and as the farthest northeastern extension of important wetlands which contain species of the Coastal Plain and Mississippi Alluvial Plain Forests.

2.5.2 Fauna

The history of animal distribution in the Western Kentucky Coal Field has been characterized by repeated major migrations, immigrations, and emigrations in response to changes in the environment over geologic time. The present distribution of animals in the region is a dynamic cumulation of these influences. Some animals with general habitat requirements are limited primarily by food supply and occur throughout most of the Coal Field (e.g., the white-footed deermouse). Other species have a marked preference for certain habitats, and as such are primarily restricted to one of the major environmental types present in the area. Some species which are found throughout the State occur in greater densities in the Coal Field due to abundant suitable habitat (e.g., the least shrew). Also, because Kentucky is centrally located in the eastern United States, both northern and southern species occur in the State as they reach the limits of their range. For example, the masked shrew (a northern species) and the southeastern shrew (a southern species) both occur in western Kentucky. An overview of present animal distributional patterns in the Western Kentucky Coal Field reveals three major components: (1) physiographic and topographic areas; (2) drainage evolution; and (3) southern and northern affinities. The following discussion focuses on these components in relation to the biogeography of the fauna.

The Mammoth Cave Plateau area contains the most rugged relief in the Coal Field. Prominent features include rocky, steep-gradient streams and numerous rockhouses along the escarpment. In this rugged topography there are a number of salamander species which prefer this mesic, cool, protected environment. The area is also inhabited by _Sorex fumeus_ (smokey shrew) which ranges in the United States from the northeast as far south as the mountains of northern Georgia. Several fish species are also characteristic of the enviromentally distinct escarpment area. The riffle dwelling darters _Etheostoma barbouri_ (teardrop darter) and Etheostoma bellum (orangefin darter) are both Green River endemics which reach their downstream limits of distribution in this area. Where Mississippian limestone outcrops in the Western Kentucky Coal Field, a karst topography prevails and its concomitant unique fauna occurs. In several instances, the total distribution of a species is limited to the band of karst topography that extends from southern Indiana to northern Alabama.

The Ohio River Hills and Lowlands Subsection, the central region of the Coal Field, is highly alluviated and contains broad river valleys and extensive swampland. Streams in the interior area are generally low gradient and lack the characteristic gravel-cobble substrate of the escarpment area. Of major interest ecologically are the wetlands, hardwood bottomlands, cypress swamps, and isolated, open-water oxbows. This area provides several different habitat types. Due to its relatively low elevation, a variety of lentic and lotic habitats are available. The area has been greatly altered due to drainage of the land for agriculture and strip mining; however, fine examples of streams and wetlands still remain.

Several species indicative of this area have the major portions of their ranges to the south, but reach the Western Kentucky Coal Field via the Mississippi Embayment. Exemplary fish species are Etheostoma histrio (harlequin darter) and Percina ouachitae (yellow darter). These species inhabit riffles and shoals of the interior region streams. Centrarchus macropterus (flier) and Elassoma zonatum (banded pygmy sunfish) are two swampland species that are indicative of the basin area. All these species are primarily distributed in the southern Coastal Plain but range up the Embayment.

Other vertebrates occurring in the interior wetland areas include wading birds and ducks. The lowlands provide excellent habitat for these birds. Most species of ducks in the Western Kentucky Coal Field do not represent breeding populations, but are residents for several months of the year. A notable exception is Aix sponsa (wood duck), a breeding inhabitant of bottomland hardwood wetlands. Wading birds such as Butorides virescens (green heron) and Ardea herodias (great blue heron) breed in Kentucky and have colonial nesting areas in the lowlands.

Geologic events which have determined the drainage basins have also influenced the present distribution of animals in the Western Kentucky Coal Field. Drainage patterns have changed greatly since preglacial times. As the glaciers repeatedly advanced and receded, the Upper Ohio River was formed and many of the old Teays tributaries of the east (e.g., Big Sandy, Little Sandy, Licking, Kentucky, and Kanawha Rivers) were diverted to the New Ohio. This drainage change allowed some eastern fish (i.e., fishes of the Teays River) to disperse into the drainages of the Western Kentucky Coal Field (Green and Tradewater Rivers).

2.5.3 Wetlands

The Western Kentucky Coal Field harbors a large and diverse system of wetlands and streams. In many instances it is neither possible nor practical to separate for management purposes wetlands from streams. In addition to riparian wetland systems, the area contains a variety of stream types ranging from rocky, high gradient, upland to sluggish, meandering lowland streams. A preliminary inventory of wetlands in the Coal Field was made by KNPC (KNPC 1980b). A total of 40 wetland areas were identified and described in their inventory.

2.5.4 Threatened And Endangered Species

2.5.4.1 Animals

Table 2.5-1 summarizes the status of the animal elements in the Western Kentucky Coal Field. A total of 66 faunal species have attained special category status in Kentucky. Seven of these species are classified as endangered by the Federal government, and one additional species (Kentucky cave shrimp) is a candidate for Federal listing. Appendix A to Chapter IX of the Technical Reference Document provides a complete listing of the animal elements. This should not be considered finalized however, as elements listed are monitored continually by KNPC staff.

Table 2.5-1. Kentucky animal and plant element status: summarization of special categories (KNPC 1980f).

Animal

Status	Pelecypod	Crustacean	Fish	Amphibian	Reptile	Bird	Mammal	Total
Endangered (Kentucky)	18	1	--	--	--	2	5	26
Endangered (Federal)	4	--	--	--	--	1	2	7
Threatened (Kentucky)	--	1	8	2	1	2	4	18
Threatened (Federal)	--	--	--	--	--	--	--	0
Special Concern (Kentucky)	--	3	12	2	1	--	--	18
Undetermined (Kentucky)	--	--	5	--	2	1	6	14
Federal Candidate for Listing	--	1	--	--	--	--	--	1
Totals	22	6	25	4	4	6	17	84

Plant

Status	Special Gymnosperms	Special Monocots	Total
Endangered (Kentucky)	5	3	8
Endangered (Federal)	-	-	-
Threatened (Kentucky)	9	-	9
Threatened (Federal)	-	-	-
Special Concern (Kentucky)	4	1	5
Undetermined (Kentucky)	-	-	-
Federal Candidate for Listing	6	-	6
Totals	24	4	28

2.5.4.2 Plants

Table 2.5-1 also summarizes the State and Federal status of floral species in the Western Kentucky Coal Field. A total of 22 plants are classified as special category species. The complete list is provided in Appendix A to Chapter IX of the Technical Reference Document. Seventeen are recognized as either threatened or endangered by the Kentucky Nature Preserves Commission. Six of these species are under consideration for Federal listing. No plants in the Western Kentucky Coal Field are presently classified by the Federal government as threatened or endangered.

Table 2.5-1 represents the most current information on plant and animal element status. The element list is a dynamic document and is updated periodically.

2.5.5 Critical Natural Areas

Interpreted critical areas, either known or high potential areas, were defined by KNPC as those resources that were considered to be irreplaceable or highly significant. Information on "known critical areas" concerns those areas that are considered irreplaceable resources. "High potential critical areas" are considered to be highly significant resources including sites managed as multiple use areas. For the purposes of evaluating New Source mining applications in the sensitive ecosystem, surface water, and wetlands categories, critical areas include:

- Stream segments designated or proposed for designation by KDNREP as coldwater aquatic habitat;
- Stream segments designated or proposed for designation by KDNREP as an outstanding resource water;
- Stream segments identified as a Sensitive Aquatic Ecosystem by KNPC;
- Stream segments identified as a high or moderate water quality stream by KNPC;
- A Sensitive Terrestrial Ecosystem designated by USEPA or USFWS and identified by KNPC;

- A fish and wildlife habitat identified by KDNREP-Fish and Wildlife Division; and

- Wetlands.

Definitions of these critical area categories are as follows:

- High quality stream. Stream in or near a natural, unpolluted condition.

- Moderate quality stream. Streams able to recover within a reasonable period of time if human perturbations were to cease.

- Sensitive aquatic ecosystem. All streams designated or proposed for designation as outstanding resource waters including but not limited to unique floral and/or faunal assemblages; unique and/or representative examples of natural flora and fauna; and/or water quality characteristics of a given physiography, hydrologic, or topographic unit; and/or a habitat necessary for the continued safe existence of a species or a group of species.

- Sensitive terrestrial ecosystem. All areas designated or proposed for designation as a public park, National Park, National Wildlife Refuge, State wildlife management area, State or National Forest, National System of Trails, Wilderness Area, National Natural Landmark, Rare II area, Nature Preserves, land owned by private conservation organizations, university owned natural areas, and areas where rare plant and animal elements occur. In addition, areas identified by KNPC as special geologic areas, karst areas, or Ecological Areas are included.

As a result of the KNPC study, certain environmentally sensitive areas have been designated as High Potential Critical Areas (HPCA) or Known Critical Areas (KCA). A map depicting the general location of these sensitive aquatic and other natural resources of the Western Kentucky Coal Field is included as Figure 2.5-1. These areas are indicated in detail in the USEPA Resource Atlas.

2.6 GEOENVIRONMENTAL RESOURCES

The Western Coal Field is one of six distinct physiographic provinces in the Commonwealth of Kentucky (McFarlan 1943). The Coal Field comprises 11.6% of the total area of Kentucky and is approximately 103 miles (east to west) by 62 miles (north to south). The generally accepted geological boundary of the Western Kentucky Coal Field is the limit of the Pennsylvanian aged strata outcrop.

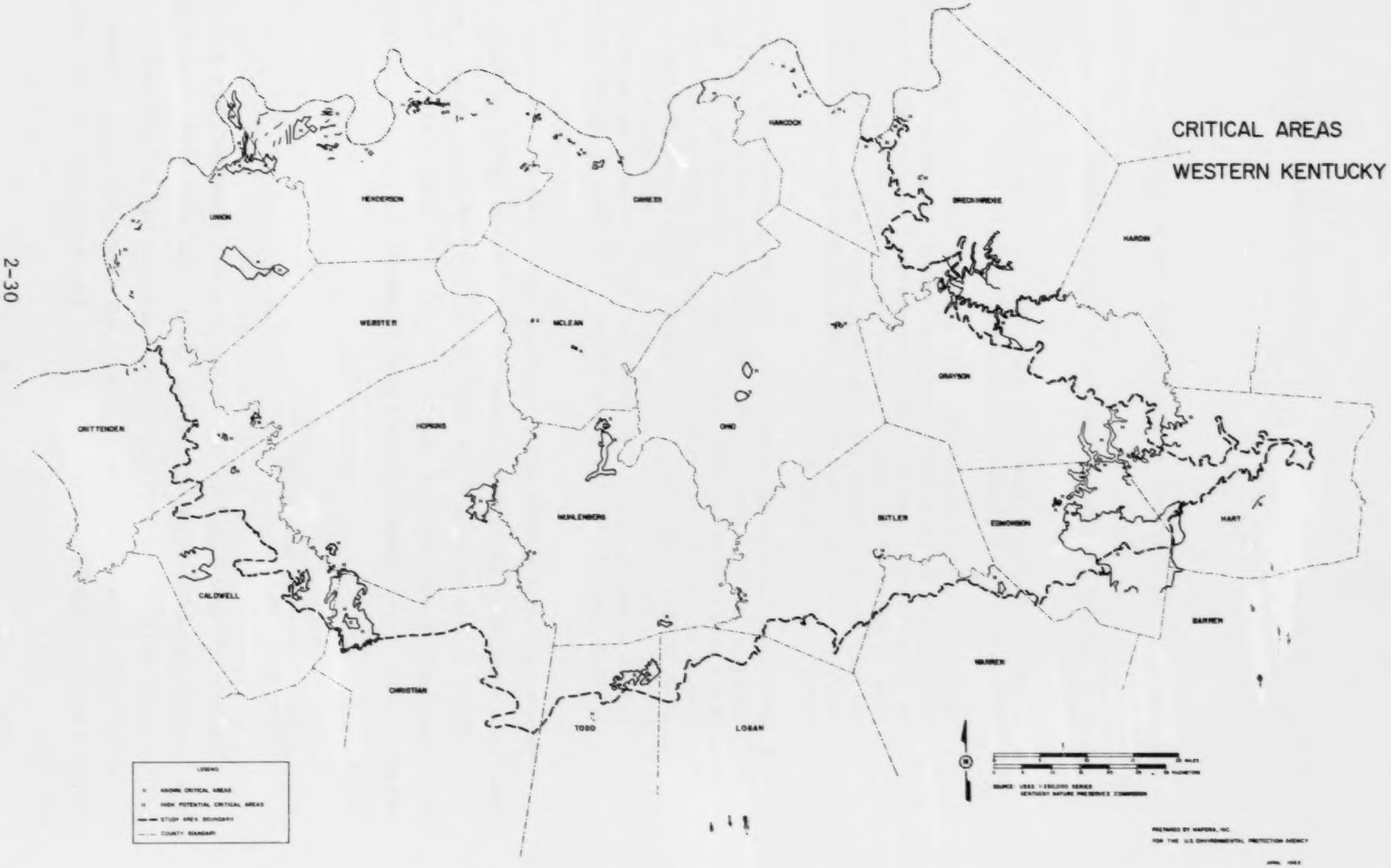

CRITICAL AREAS
WESTERN KENTUCKY
UNION
HENDERSON
DAVIESS
HANCOCK
BRECKINRIDGE
HARDIN
WEBSTER
McLEAN
OHIO
GRAYSON
CRITTENDEN
HOPKINS
MUHLENBERG
BUTLER
EDMONSON
HART
CALDWELL
CHRISTIAN
TODD
LOGAN
WARREN
BARREN
LEGEND
KNOWN CRITICAL AREAS
HIGH POTENTIAL CRITICAL AREAS
STUDY AREA BOUNDARY
COUNTY BOUNDARY
MILES
KILOMETERS
SOURCE: USGS 1:250,000 SERIES
KENTUCKY NATURE PRESERVES COMMISSION
PREPARED BY WAPORA, INC.
FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

Figure 2.5-1. Critical areas in the Western Kentucky Coal Field.

2.6.1 Topography

The Western Kentucky Coal Field is comprised of two regions, the central coal field area and the rim or Pottsville Escarpment, with slight topographical and geomorphological differences. The central portion is characterized by gently rolling to hilly uplands separated by wide, flat alluvial valleys (Burroughs 1924). It is a mature upland that is well dissected by drainage features and covered by a blanket of loess (fine grained, wind deposited materials) which gives the hills their characteristic gently rounded subdued appearance (Harvey 1956). The minor streams cut narrow, steep-sided valleys through the uplands while the major streams (notably the Green, Tradewater, Mud, and Pond Rivers) have characteristic broad, flat alluvial valleys that are often poorly drained and swampy (McGrain and Currens 1978). These valleys are often flooded during winter and spring rises of river levels (Harvey 1956).

Elevations in the central portion of the Coal Field range from approximately 340 feet mean sea level (msl) to around 500 to 600 feet msl in the upland areas. An exception to this is a belt of increased relief, five to ten miles wide, that follows the trend of the Rough Creek Fault Zone in an easterly direction across the Coal Field (Harvey 1956).

The rim or perimeter of the Coal Field is an outward facing cuesta (McFarlan 1943), the Pottsville Escarpment, which is capped by resistant sandstones of the Caseyville Formation. The Pottsville Escarpment is the limit of Pennsylvanian aged rock outcrop and as such is the limit of the Western Kentucky Coal Field physiographic province. The escarpment is characterized by sandstone-capped hills and ridges with steep slopes that may be precipitous (McGrain and Currens 1978). The terrain is rugged and characterized by narrow, gorge-like valleys (McGrain and Currens 1978) and relief may reach as much as 400 feet. Elevations in the Escarpment range from approximately 400 feet near major streams to 850 feet.

2.6.2 Geology

The Western Kentucky Coal Field, a portion of the Illinois Basin, is part of a cratonic area that is characterized by deposition and deformation (regional warping and differential sinking) since the Precambrian Era (Atherton 1971). The oldest sedimentary rocks found in the Coal Field are south of the Rough Creek Fault Zone and are Middle Cambrian in age (Kraussee *in* Palmer and Dutcher 1979). Shales deposited during this period represent the first transgression of the seas followed by deposition of clastic sediments during Upper Cambrian times. Deposition of marine limestones and shales occurred during Ordovician and Silurian times with minor periods of intermittent erosion. The Devonian Period marked the beginning of major transgressions of the seas; oscillation of the shoreline ended in the Middle Devonian Period which was also a period of uplift and erosion (Atherton 1971). The Illinois Basin was slowly subsiding and deposition continued gradually through the Devonian into the Mississippian Period. The rhythmical alterations of oscillating seas caused deposition of limestone dominated rocks during the Upper Mississippian. The shoreline then retreated as the Basin was tilted to the south and eroded (Atherton 1971) and Pennsylvanian sediments were later deposited on this Mississippian erosional surface.

Pennsylvanian strata represent continuous deltaic deposition on a broad, shallow, slowly subsiding shelf. Terrigenous sediments (e.g., mud, silt, and sand) were deposited as numerous shifting and prograding delta lobes of the Michigan River System. Sediment sources were the Canadian Shield and the Appalachian Highlands (Pryor and Sable 1974). Broad, regional uplift followed deposition of the Pennsylvanian sediments which was followed in turn by erosion and leveling of the Illinois Basin (Pryor and Sable 1974).

Pennsylvanian sediments are cyclic with at least 50 cyclic units being recognized (Atherton 1971). World-wide sea level fluctuations probably account for the rhythmic nature of these sediments; the earlier transgressions entered the basin from the east and the later transgressions entered from the west around the north side of the Ozark Dome (Atherton 1971). The fluctuations in sea level also account for the beginnings and terminations of coal forming swamps in the Illinois Basin. As many as 33 different coal beds have been identified in western Kentucky (Rice et al. 1979). It is believed that the coal fields of eastern and western Kentucky were once continuous across the Cincinnati Arch (McFarlan 1943).

2.6.3 Soils

Ten general soil associations occur within the Western Kentucky Coal Field. These associations are described below and their locations are indicated in Figure 2.6-1. Data for the soil associations were compiled from large scale maps and published soil surveys. For detailed descriptions of site-specific soils, the local Soil Conservation Service office or agricultural extension office should be consulted.

- Huntington-Melvin Association. Deep, well-drained to poorly-drained soils that occur on floodplains of the Ohio River. The soils are mixed alluvial soils, non-acid, have very high to high moisture-supplying capacity, and consist of silt loams, sandy loams, and silty clay loams (USDA 1967).
- Uniontown-Patton Association. Deep, well-drained to poorly drained soils that occur on level, wide terraces of the Ohio River. The soils are silty and consist of silt loams and silty clay loams (USDA 1967).
- Belknap-Karnak Association. Deep, poorly drained, nearly level soils that occur on floodplains of the Green River and Tradewater River and their tributaries. The soils are medium to fine textured and consist of silt loams and silty clays (USDA 1974).
- Elk-Weinbach-Melvin Association. Deep, well-drained to poorly drained soils that are nearly level and occur on flood plains and terraces of the Ohio River. The soils are mixed alluvial soils and are silt loams (USDA 1974).
- Memphis-Loring Association. Deep, well-drained to moderately well-drained soils that are gently sloping to steep on uplands and soils that are somewhat poorly drained and nearly level on floodplains. The soils are medium textured and occur as silt loams and silty clay loams (USDA 1974).
- Grenada-Loring Association. Deep, moderately well-drained soils that are gently sloping to moderately steep and occur on uplands. The soils formed in loess and are silt loams (USDA 1980d).
- Zanesville-Frondorf Association. Deep and moderately deep, well-drained to poorly drained soils that are nearly level to steep and occur on uplands and undulating broad ridgetops. The soils are medium textured and formed from acid sandstones, shales, and thin loess mantles. They occur as silt loams (USDA 1977).

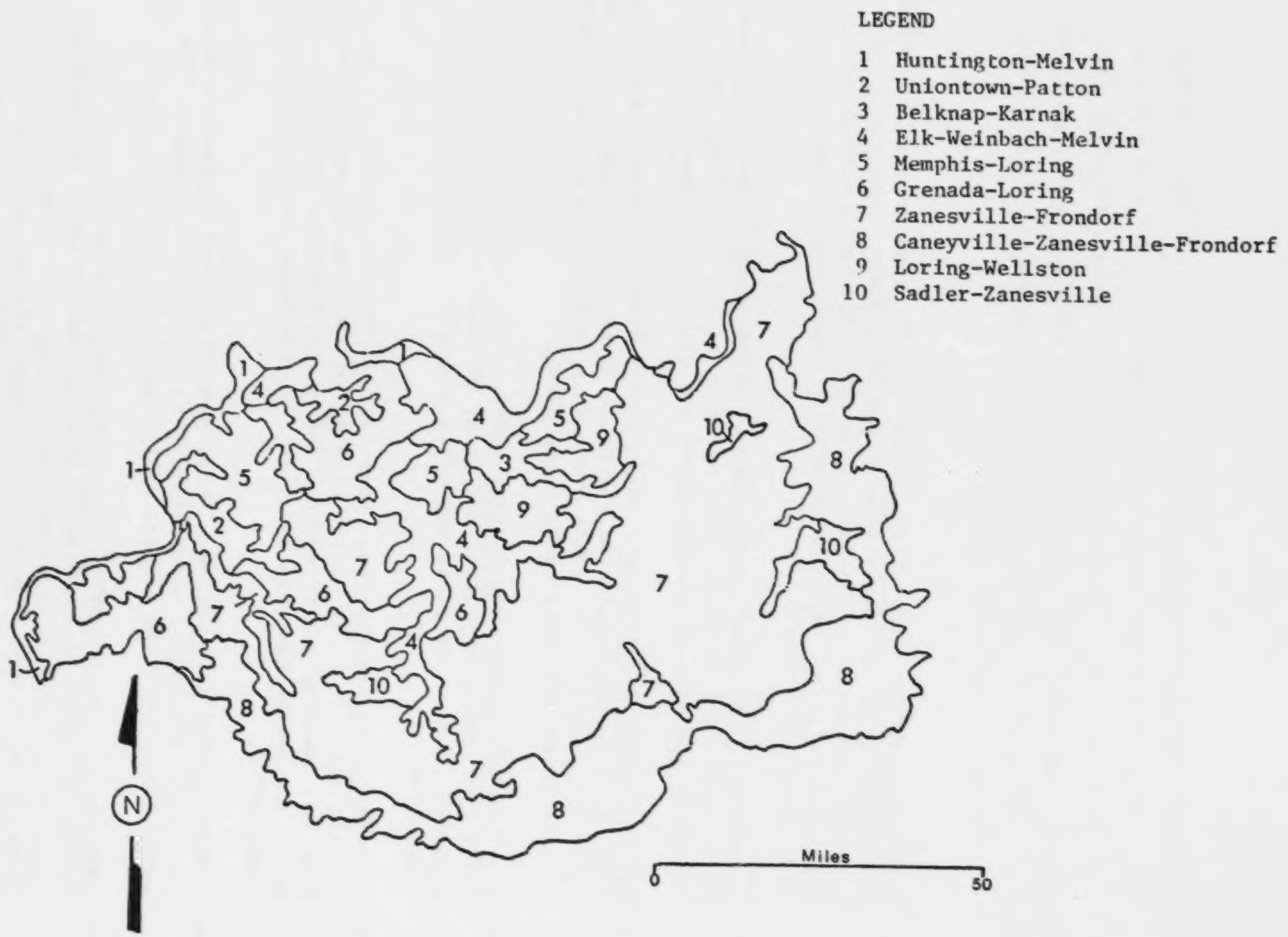

LEGEND
1 Huntington-Melvin
2 Uniontown-Patton
3 Belknap-Karnak
4 Elk-Weinbach-Melvin
5 Memphis-Loring
6 Grenada-Loring
7 Zanesville-Frondorf
8 Caneyville-Zanesville-Frondorf
9 Loring-Wellston
10 Sadler-Zanesville
Miles
0
50
N

Figure 2.6-1. Western Kentucky Coal Field general soil associations (USDA 1979).

- Caneyville-Zanesville-Frondorf Association. Moderately deep and deep, moderately well-drained soils that are gently sloping to steep. The soils occur on narrow hilltops and side slopes and formed in loess, sandstone, siltstone, and limestone. They occur as silt loams (USDA 1980d).

- Loring-Wellston Association. Deep, moderately well-drained and well-drained soils that are gently sloping to steep. The soils are medium textured to loamy and occur on uplands, hilltops, and side slopes. They formed in loess and the underlying sandstone, siltstone, and shale and occur as silt loams (USDA 1974).

- Sadler-Zanesville Association. Deep, moderately well drained to well drained soils that are gently sloping to moderately steep. The soils are medium textured, formed from loess, sandstone and shale, and occur on uplands as silt loams (USDA 1977).

2.6.4 Acid Mine Drainage

Acid mine drainage includes all types of mine drainage associated with coal mining operations such as discharges pumped from or draining from coal operations that are acid, alkaline, or neutral but still produce substantial amounts of unwanted pollutants. Chemical pollution occurs when soluble or leachable compounds present in coal, soil, overburden, or other mine wastes enter the drainage systems in mining areas. Most of this pollution results from the oxidation of sulfide minerals such as pyrite and marcasite (USEPA 1973). The oxidation of these compounds results in the production of ferrous iron and sulfuric acid and continues to form ferric hydroxide and more sulfuric acid. When exposed to air and water, iron sulfides that occur in coal and the overburden oxidize to form a series of hydrous sulfates that are soluble in water. This process creates the bulk of acid mine drainage. The amount and rate of acid formation are functions of the amount and type of iron sulfides in the overburden rock and in the coal, the time of exposure, the characteristics of the overburden, and the amount of available water (Hill and Grim 1975).

The addition of acid mine dainage to a drainage system can result in chemical and physical changes in stream characteristics. Physical changes result from either deposition of metal hydroxides upon the stream substrate or from metal hydroxides remaining in suspension, resulting in reduced light penetration. Chemical changes occur as: (1) reduction of the stream pH;

(2) alteration of the bicarbonate buffering system; (3) a chemical oxygen demand if the mine drainage is poorly oxidized; and (4) the addition of metal salts (Herricks 1975). The quality of waters affected by acid mine drainage is variable but general characteristics of affected streams include (Herricks and Cairns 1974):

- pH - less than 6.0
- Acidity - greater than 3 mg/l
- Alkalinity - normally 0
- Alkalinity/Acidity - less than 1.0 mg/l
- Fe - greater than 0.5 mg/l
- SO_4 - greater than 250 mg/l
- Total suspended solids - greater than 250 mg/l
- Total dissolved solids - greater than 500 mg/l
- Total hardness - greater than 250 mg/l

The Western Kentucky Coal Field contains vast known reserves of unmined coal. Of these, only 5% have been mined (Smith and Brant 1978). This large reserve of mineable coal indicates a high potential for erosion and acidic or toxic overburden problems. Surface mines have the potential to cause erosional problems and acid mine drainage problems. Surface mining in western Kentucky takes the form of area stripping rather than contour stripping or mountaintop removal and this method generally produces fewer problems than the others. Toxic overburden and runoff are easier to control in area stripping operations. Underground mining as practiced in western Kentucky may also involve acid mine drainage problems. Also, there are large areas of abandoned or orphan mined lands in western Kentucky which usually have erosional and acid drainage problems associated with them.

Strata in the Western Kentucky Coal Field that are generally considered to be toxic include certain shales and sandstones. All black shales are toxic. Black shales are found in all of the coal-bearing formations (Tradewater, Carbondale, and Sturgis Formations) in the Coal Field. The basal 15 to 20 feet of most sandstone units is considered toxic (Williamson 1980). Because limestones are also found in the coal-bearing strata, the neutralization potential is also high for most sections of overburden.

Acid mine drainage from open pits, underground mines, abandoned spoils, gob piles, and other coal-related wastes is a potential hazard. All western

Kentucky coals have substantial sulfur contents (Harvey 1977) so that in any area where coal beds have been exposed or disturbed or where coal-related wastes are piled the potential hazard for acid mine drainage is significant. Of the most economically important western Kentucky coals, the No. 9 Coal and the No. 6 Coal are the beds usually associated with acidic or toxic problems. The No. 11 Coal and the No. 12 Coal are usually separated by the Providence Limestone which buffers the potential for acid formation and thereby reduces environmental problems. The No. 13 Coal and the No. 14 Coal are not associated with any major problems (Williamson 1980).

2.7 HUMAN RESOURCES

2.7.1 Population

The twenty-county Western Kentucky Coal Field study area has shown three distinct periods of growth. The Coal Field was initially settled in the late 1700's by settlers originating primarily from Virginia, the Carolinas, and Pennsylvania. The population grew at a slow but constant rate until the beginning of the twentieth century, with much of the growth attributed to immigration rather than natural increases. Between 1900 and 1960, population growth in the Coal Field slowed dramatically and the number of inhabitants remained relatively constant, fluctating between 400,000 and 450,000 persons. During the decade of the 1960's, an increased rate of population growth occurred, closely approximating the 6.0% increase seen in the Commonwealth as a whole (Table 2.7-1). Only eight of the twenty Coal Field counties did not experience net increases in population during this period. Two counties, Hancock and Warren, exhibited dramatic population increases of 32.8% and 26.2%, respectively, between 1960 and 1970.

Between 1970 and 1980 the Coal Field counties as a group grew at a faster rate than the Commonwealth as a whole. All of the counties experienced net increases during this period with most of the major coal-producing counties (Muhlenberg, Ohio, Union, Webster, Hopkins, Butler, Daviess, Henderson, and McLean Counties) exhibiting rapid rates of increase (Table 2.7-1).

Table 2.7-1. Population trends in the Western Kentucky Coal Field, 1960-1980 (USDOC 1973; USDOC 1981).

				% Change	
County	1960	1970	1980	1960-1970	1970-1980
Kentucky	3,038,156	3,220,711	3,661,433	6.0	13.7
Study Area	450,281	476,949	548,992	5.9	15.1
Breckinridge*	14,734	14,789	16,861	0.4	14.0
Butler*	9,586	9,723	11,064	1.4	13.8
Caldwell*	13,073	13,179	13,473	0.8	2.2
Christian*	56,904	56,224	66,878	-1.2	18.9
Crittenden*	8,648	8,493	9,207	-1.8	8.4
Daviess	70,588	79,486	85,949	12.6	8.1
Edmonson*	8,085	8,751	9,962	8.2	13.8
Grayson*	15,834	16,445	20,854	3.9	26.8
Hancock	5,330	7,080	7,742	32.8	9.4
Hart*	14,119	13,980	15,402	-1.0	10.2
Henderson	33,519	36,031	40,849	7.5	13.4
Hopkins	38,458	38,167	46,174	-0.8	21.0
Logan*	20,896	21,793	24,138	4.3	10.8
McLean	9,355	9,062	10,090	-3.1	11.3
Muhlenberg	27,791	27,537	32,238	-0.9	17.1
Ohio	17,725	18,790	21,765	6.0	15.8
Todd*	11,364	10,823	11,874	-4.8	9.7
Union	14,537	15,882	17,821	9.3	12.2
Warren*	45,491	57,432	71,828	26.2	24.1
Webster	14,244	13,282	14,823	-6.8	11.7

*Indicates partial inclusion in study area.

Official population projections for Kentucky to the year 2020 have been prepared by the University of Kentucky (Brockway and Sager 1979). As indicated in Table 2.7-2, the populations of Kentucky, the Western Kentucky Coal Field study area, and the counties that comprise the study area are projected to increase in size through 2020. The study area is projected to increase by 20.4% from 1980 to 2000 and 19.5% from 2000 to 2020. With only a few exceptions, the rate of population change in the twenty-county study area is projected to decrease after 2000, although the number of residents will continue to increase. The three exceptions to this projected trend are Christian, Logan, and Todd Counties which are only partially included in the study area, and are evidently influenced by different growth factors than the other Coal Field counties.

2.7.2 Economy

2.7.2.1 Income

The income characteristics of residents of the Western Kentucky Coal Field can best be described by measures of per capita income, median family income, changes in per capita and median family income levels, and the relative number of low income families living in the study area counties. The most recent income data available at the county level are for income earned during 1977.

The 1977 per capita income of the residents of the study area ranged from $3,431 in Edmonson County to $7,526 in Hopkins County. Statewide, the 1977 per capita income was $5,989. The study area had the fastest growing per capita income of all regions of the State.

Median family income in 1977 for the counties in the study area ranged from $8,000 in Hart County to $14,700 in both Daviess and Henderson Counties. The average of all median family income by county for the study area was approximately $10,800 while the median family income of the State was $12,300.

Another indicator of the economic conditions in a county is the percentage of low income families. A low income family is defined as one having an

Table 2.7-2. Population projections for the Western Kentucky Coal Field, 1980-2020 (Brockway and Sager 1979).

						% Change	
County	1980	1990	2000	2010	2020	1980-2000	2000-2020
Kentucky	3,567,144	3,966,653	4,355,851	4,747,005	5,138,795	22.1	18.0
Study area	505,608	556,772	608,685	665,224	726,156	20.4	19.5
Breckinridge*	16,111	17,593	18,897	20,199	21,403	17.3	11.7
Butler*	10,612	11,410	12,002	12,571	12,981	13.1	8.2
Caldwell*	13,368	14,168	14,954	15,778	16,601	11.9	9.9
Christian*	70,412	80,307	94,290	114,219	140,772	33.9	49.3
Crittenden*	9,253	10,287	11,379	12,599	13,894	22.9	22.1
Daviess	82,088	89,672	95,905	100,849	105,062	16.8	9.5
Edmonson*	9,555	10,377	11,063	11,619	12,033	15.8	8.8
Grayson*	20,032	23,058	26,033	29,177	32,247	30.0	23.9
Hancock	7,406	7,928	8,407	8,736	8,957	13.5	6.5
Hart*	15,391	16,828	18,123	19,503	20,887	17.8	15.3
Henderson	39,125	43,686	47,873	51,756	55,389	22.4	15.7
Hopkins	11,936	13,001	14,066	15,179	16,316	17.8	16.0
Logan*	22,281	24,084	26,047	28,176	30,470	16.9	17.0
McLean	11,011	12,963	15,000	17,228	19,588	36.2	30.6
Muhlenberg	32,320	34,182	35,690	37,023	38,056	10.4	6.6
Ohio	22,522	25,950	29,498	33,361	37,290	30.9	26.4
Todd*	15,505	13,701	14,972	16,420	18,008	19.7	20.3
Union	18,571	20,376	22,134	23,841	25,476	19.2	15.1
Warren*	65,425	69,653	72,808	75,178	76,515	11.3	5.1
Webster	15,684	17,548	19,544	21,812	24,211	24.6	23.9

*Indicates partial inclusion in study area.

income of less than 80% of the median family income of the county. Two Coal Field counties, Christian and Hart, had 50% or more of their resident families classified as low income in 1977. Most of the remaining counties had from 30% to 40% low income families while only one-quarter of the families in Hancock County were classified as low income in 1977. Statewide, 38% of all families in Kentucky are classified as low income.

2.7.2.2 Labor Force Characteristics

The characteristics of the 1979 civilian labor force for each of the Western Kentucky Coal Field counties, the Coal Field as a whole, and the State are indicated in Table 2.7-3. The Coal Field had a total civilian labor force in 1979 of 237,692 persons representing approximately 15% of the labor force of Kentucky. As with the State as a whole, the vast majority (88.2%) of Coal Field workers are employed in non-agricultural industries. Only 6.2% of the study area labor force was engaged in agricultural work in 1979.

The rate of unemployment in the Coal Field counties ranged from 3.4% in Union County to 14.5% in Edmonson County in 1979. Generally, the counties with larger labor forces exhibited lower unemployment than counties with smaller labor forces. The study area as a whole had an unemployment rate of 5.6% which was equal to the overall State unemployment rate.

In 1979, 10,634 persons were directly employed by coal mining activities in the Western Kentucky Coal Field. A total of 193 mines were operating in that year with all but 32 of these being surface mines (KDMM 1979). Muhlenberg County had the greatest number of persons employed by mining activities (2,852) and also produced the most coal (12,218,134 tons) in the Coal Field. Hancock County at the other extreme had only nine persons employed by coal mining and produced only 834 tons of coal in 1979.

2.7.3 Transportation Network

Transportation facilities are available within the Western Kentucky Coal Field in the form of highways, railways, air fields, and navigable waterways. As indicated in Figure 2.7-1, the study area is served by a network of major

Table 2.7-3. Labor force characteristics of residents of the Western Kentucky Coal Field, 1979 (KDHR 1980).

County	Civilian Labor Force	Employment			Rate of Unemployment
		Agricultural	Non-agricultural	Total	
Breckinridge*	6,570	1,112	5,008	6,120	6.8
Butler*	3,468	409	2,744	3,149	9.2
Caldwell*	5,398	455	4,494	4,949	8.3
Christian*	22,327	1,471	19,601	21,072	5.6
Crittenden*	4,078	356	3,430	3,786	7.2
Daviess	37,927	1,332	34,465	35,797	5.6
Edmonson*	2,689	218	2,080	2,298	14.5
Grayson*	8,718	826	7,219	8,045	7.7
Hancock	3,540	192	3,125	3,317	6.3
Hart*	5,989	1,242	4,279	5,521	7.8
Henderson	18,582	636	16,987	17,623	5.2
Hopkins	21,895	485	20,131	20,616	5.8
Logan*	10,506	1,408	8,573	9,981	5.0
McLean	4,614	473	3,845	4,318	6.4
Muhlenberg	13,250	388	12,139	12,527	5.5
Ohio	12,331	537	11,258	11,795	4.3
Todd*	4,565	863	3,406	4,269	6.5
Union	8,406	616	7,500	8,116	3.4
Warren*	36,101	1,416	33,271	34,687	3.9
Webster	6,738	421	6,024	6,445	4.3
Study Area	237,692	14,852	209,579	224,431	5.6
State	1,563,000	73,049	1,402,951	1,476,000	5.6

*Indicates partial inclusion in the study area.

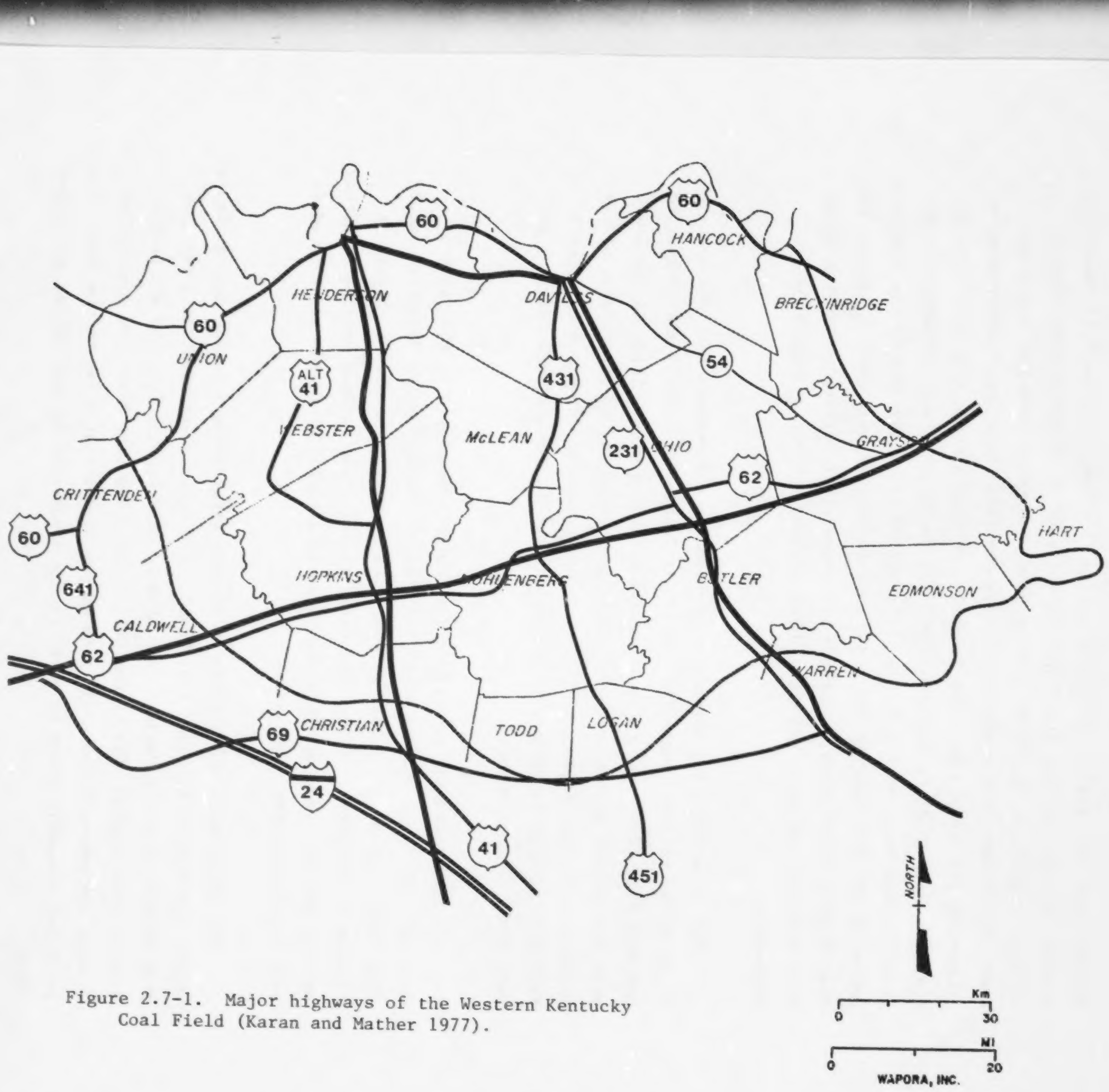

60
HANCOCK
60
HENDERSON
DAVIESS
BRECKINRIDGE
60
UNION
54
431
ALT 41
WEBSTER
McLEAN
231
OHIO
GRAYSON
62
CRITTENDEN
HART
60
HOPKINS
MUHLENBERG
BUTLER
EDMONSON
641
CALDWELL
62
WARREN
69
CHRISTIAN
TODD
LOGAN
24
41
451
NORTH
Km
0
30
MI
0
20
WAPORA, INC.

Figure 2.7-1. Major highways of the Western Kentucky Coal Field (Karan and Mather 1977).

highways and toll roads. US 431 extending from Owensboro south to Nashville roughly divides the Coal Field in half while US 60 is the primary highway corridor running along the Ohio River on the northern border of the study area. Multi-lane toll roads or parkways complete the highway transportation network in the study area. The Pennyrile Parkway extends from Henderson on the Ohio River south to Hopkinsville. The Western Kentucky Parkway extends from the Blue Grass region of the State across the study area to the southwest corner of the State and is the major east-to-west highway passing through the Coal Field. Other parkways include the Green River Parkway connecting Owensboro with Bowling Green and the Audubon Parkway connecting Owensboro to Henderson.

Rail transportation service is provided to the Western Kentucky Coal Field by two railroad companies. Illinois Central Gulf (ICG) and Louisville and Nashville (L&N) operate railroad lines between major cities in the study area and provide access to major trunk lines extending to other parts of the State and country (Figure 2.7-2). As coal production increases in western Kentucky, greater importance will be placed on rail transportation as a primary means of coal movement.

Air transportation services are not highly developed in the Western Kentucky Coal Field because of the relatively low population densities occurring in most areas. The only airport with scheduled commercial flights is located at Owensboro. Other commercial airports are located outside the Study Area at Bowling Green and Paducah. General aviation airfields are located in most counties of the study area.

The Green River and Ohio River provide water transportation opportunities within the Western Kentucky Coal Field. The Green River provides a six-foot deep channel from the Mammoth Cave Area to near Central City and a nine-foot channel from Central City to the Ohio River. The Ohio River has a nine-foot channel and connects the study area to the Mississippi River to the west. The principal commodity moved by water in the study area is coal (Karan and Mather 1977).

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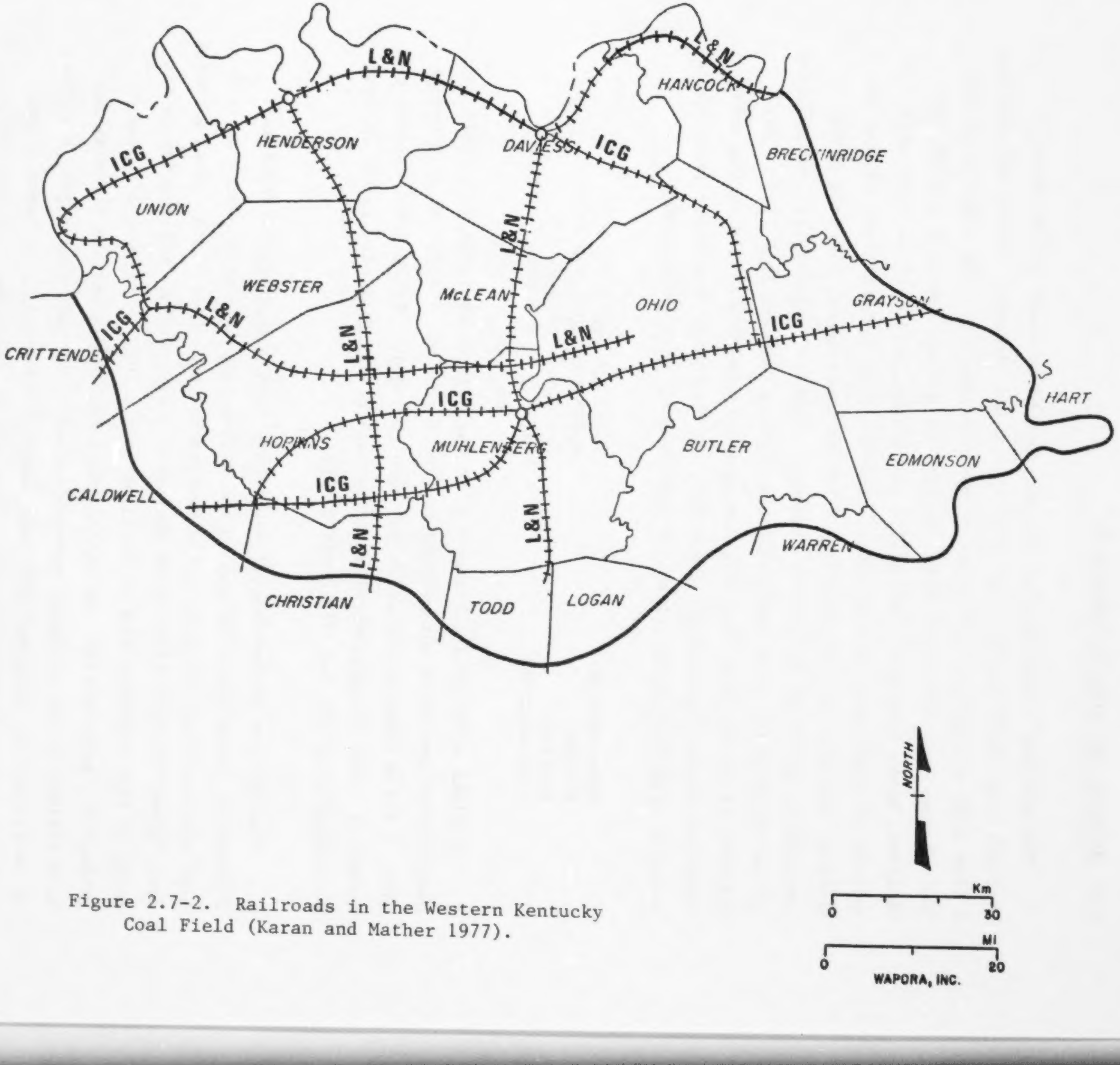
L&N
ICG
HENDERSON
DAVIESS
HANCOCK
BRECKINRIDGE
UNION
WEBSTER
McLEAN
OHIO
GRAYSON
CRITTENDEN
HART
HOPKINS
MUHLENBERG
BUTLER
EDMONSON
CALDWELL
WARREN
CHRISTIAN
TODD
LOGAN
NORTH
Km
0
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WAPORA, INC.

Figure 2.7-2. Railroads in the Western Kentucky Coal Field (Karan and Mather 1977).

2.8 CULTURAL AND HISTORIC RESOURCES

The cultural resources that can be expected to occur in the Western Kentucky Coal Field include both prehistoric and historic remains representing a time span of nearly 15,000 years of human occupation. The types of archaeological resources which have been recorded in western Kentucky include rockshelters, mound complexes, petroglyph earthworks, burial sites, and caves. A variety of prehistoric Indian sites, post-European contact sites related to military actions, early farming and frontier settlements, historic dumps, cemeteries, and sites related to industry, commerce, engineering, and religion can be expected to occur throughout the Western Kentucky Coal Field. Prehistoric sites are often the most numerous entities identified during environmental impact archaeological surveys. In Kentucky, four broad prehistoric cultural traditions/classifications have been defined (KNPC 1980):

Paleo-Indian	15,000 B.C. to 4,000 B.C.
Archaic	8,000 B.C. to 1,500 B.C.
Woodland	1,500 B.C. to A.D. 900
Mississippian	A.D. 900 to European Contact

Previous archaeological research in the Western Kentucky Coal Field has been neither extensive nor systematic (Collins et al. 1981). As of November 1980, 1,493 archaeological sites had been recorded. Figure 2.8-1 depicts the number of known archaeological sites on each of the USGS topographic quadrangles comprising the Coal Field (KNPC 1980).

Although few archaeological sites have been adequately surveyed and documented, major contributions to the archaeology of eastern North America have resulted from research in the Western Kentucky Coal Field. Data gathered from "Green River Archaic" sites represent a significant contribution to the study of the Archaic tradition (Collins et al. 1981). Because a number of geological, geographical, and biological variables in western Kentucky may have influenced the cultural resource potential of past landscapes, a variety of environmental areas may have been amenable to prehistoric human groups. Alluvial valley floors, terraces, flood plains, hillsides, uplands, slopes, sandstone rock shelters, and caves may have been locations of past human occupancy.

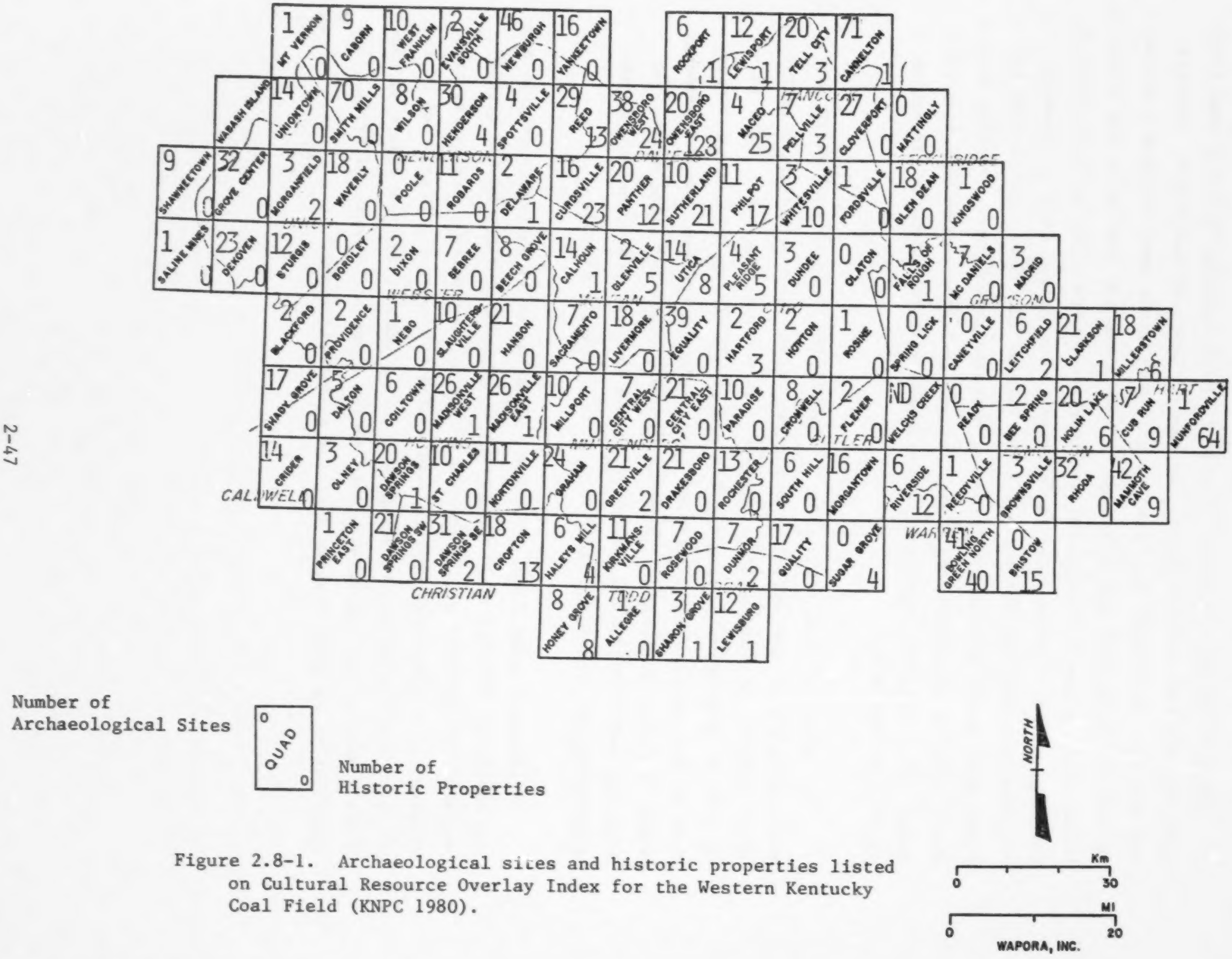

1 MT VERNON 0
9 CABORN 0
10 WEST FRANKLIN 0
2 EVANSVILLE SOUTH 0
46 NEWBURGH 0
16 YANKEETOWN 0
6 ROCKPORT 1
12 LEWISPORT 1
20 TELL CITY 3
71 CANNELTON 1
WABASH ISLAND
14 UNIONTOWN 0
70 SMITH MILLS 0
8 WILSON 0
30 HENDERSON 4
4 SPOTTSVILLE 0
29 REED 13
38 OWENSBORO WEST 24
20 OWENSBORO EAST 123
4 MACEO 25
7 PELLVILLE 3
27 CLOVERPORT 0
0 MATTINGLY 0
9 SHAWNEETOWN 0
32 GROVE CENTER 0
3 MORGANFIELD 2
18 WAVERLY 0
0 POOLE 0
11 ROBARDS 0
2 DELAWARE 1
16 CURDSVILLE 23
20 PANTHER 12
10 SUTHERLAND 21
11 PHILPOT 17
3 WHITESVILLE 10
1 FORDSVILLE 0
18 GLEN DEAN 0
1 KINGSWOOD 0
1 SALINE MINES 0
23 DEKOVEN 0
12 STURGIS 0
0 BORDLEY 0
2 DIXON 0
7 SEBREE 0
8 BEECH GROVE 0
14 CALHOUN 1
2 GLENVILLE 5
14 UTICA 8
4 PLEASANT RIDGE 5
3 DUNDEE 0
0 OLATON 0
1 FALLS OF ROUGH 1
7 MC DANIELS 0
3 MADRID 0
2 BLACKFORD 0
2 PROVIDENCE 0
1 NEBO 0
10 SLAUGHTERSVILLE 0
21 HANSON 0
7 SACRAMENTO 0
18 LIVERMORE 0
39 EQUALITY 0
2 HARTFORD 3
2 HORTON 0
1 ROSINE 0
0 SPRING LICK 0
0 CANEYVILLE 0
6 LEITCHFIELD 2
21 CLARKSON 1
18 MILLERSTOWN 6
17 SHADY GROVE 0
5 DALTON 0
6 COILTOWN 0
26 MADISONVILLE WEST 1
26 MADISONVILLE EAST 1
10 MILLPORT 0
7 CENTRAL CITY WEST 0
21 CENTRAL CITY EAST 0
10 PARADISE 0
8 CROMWELL 0
2 FLENER 0
ND WELCHS CREEK
0 READY 0
2 BEE SPRING 0
20 NOLIN LAKE 6
57 CUB RUN 9
1 MUNFORDVILLE 64
14 CRIDER 0
3 OLNEY 0
20 DAWSON SPRINGS 1
10 ST CHARLES 0
11 NORTONVILLE 0
24 GRAHAM 0
21 GREENVILLE 2
21 DRAKESBORO 0
13 ROCHESTER 0
6 SOUTH HILL 0
16 MORGANTOWN
6 RIVERSIDE 12
1 REEDVILLE 0
3 BROWNSVILLE 0
32 RHODA 0
42 MAMMOTH CAVE 9
1 PRINCETON EAST 0
21 DAWSON SPRINGS SW 0
31 DAWSON SPRINGS SE 2
18 CROFTON 13
6 HALEYS MILL 4
11 KIRKMANSVILLE 0
7 ROSEWOOD 0
7 DUNMOR 2
17 QUALITY 0
0 SUGAR GROVE 4
41 BOWLING GREEN NORTH 40
0 BRISTOW 15
8 HONEY GROVE 8
1 ALLEGRE 0
3 SHARON GROVE 1
12 LEWISBURG 1
CALDWELL
CHRISTIAN
TODD
Number of Archaeological Sites
QUAD
Number of Historic Properties
NORTH
Km
0
30
MI
0
20
WAPORA, INC.

Figure 2.8-1. Archaeological sites and historic properties listed on Cultural Resource Overlay Index for the Western Kentucky Coal Field (KNPC 1980).

Historic surveys have been completed by the Kentucky Historic Commission (KHC) in only two counties within the Western Kentucky Coal Field, Christian and Daviess. Historians and architectural historians have recorded a variety of historic structures and buildings including but not limited to the following: houses (both vernacular and great architecture); commercial and institutional buildings; barns; smokehouses; springhouses; corn cribs; carriage houses; churches; schools; and bridges. The KHC surveys have been concentrated in those areas where development threatens historic structures. Existing data on known historic structures and properties are indicated on the KNPC inventory maps. As of December 1980, KNPC reported 163 recorded historic properties within the Coal Field.

The method of coal extraction in the Western Kentucky Coal Field which most threatens archaeological resources is termed box-cut mining, a technique which involves opening up large surface area strip-mining pits. This method as well as underground mining require additional mining-related activities such as coal preparation plants and transportation systems. Topsoil removal, sediment ponds, hydrologic control structures, spoil and stock piles, and blasting contribute to the amount of ground surface alterations and to the destruction of archaeological materials on or in the ground.

Evidence of past human occupation and behavior is extremely fragile and can easily be obliterated by relatively minor modifications of the ground surface. The analysis and interpretation of archaeological remains requires examination of the total physical and ecological context. Disruption of the context, such as may occur during coal mining activities, can reduce or completely destroy the recoverable information about past human existence, thus constituting an irretrievable loss for scientific study.

3.0 REGULATIONS GOVERNING MINING ACTIVITIES IN THE WESTERN KENTUCKY COAL FIELD

The National Environmental Policy Act of 1969 (NEPA; 42 USC 4321 et seq.) mandates the consideration of environmental factors by Federal decisionmakers during the evaluation of major Federal actions which may significantly affect the environment. The issuance of a New Source National Pollutant Discharge Elimination System (NPDES) permit by USEPA was defined by Congress in the Clean Water Act (CWA Section 511(c); 33 USC 1251 et seq.) to be a major Federal action. USEPA must thus conduct NEPA reviews when processing NPDES permits for the construction and operation of New Source coal mines and coal cleaning facilities.

USEPA's responsibilities in the regulation of coal mining operations are paralleled by those of the Office of Surface Mining (OSM) or the delegated State regulatory authority under the Surface Mining Control and Reclamation Act (SMCRA; 30 USC 1201 et seq.) and by other government agencies. The issuance of mining and operations permits under SMCRA by OSM is subject to the provisions of NEPA, but OSM intends for these permits to be issued by state agencies pursuant to an approved state program. While state issuance of the permit will not trigger NEPA compliance, the state programs will apply the environmental standards of SMCRA to coal mining activities.

The overlapping responsibilities of USEPA and OSM or their designated state regulatory authorities have been addressed in several Draft Memoranda of Understanding (MOU) between USEPA and the Department of Interior (DOI) of which OSM is a part. These memoranda concern regulatory responsibilities related to such concerns as state program review, NEPA compliance requirements, and duplication of programmatic responsibilities. One such Memorandum of Understanding signed during the Carter Administration (November 1980; 45 FR 246) establishes an overall agreement outlining the responsibilities of each agency designed to substantially eliminate the potential for regulatory duplication. No such similar agreement, however, currently exists between USEPA and other Kentucky agencies although one is contemplated. The development and implementation of a NEPA compliance strategy for USEPA is complicated by the uncertain status and often duplicative nature of the various levels of control over coal mining activities. This chapter provides an overview of the environmentally protective Federal and State laws and regulations that apply to coal mining operations and the interrelationships which exist between the responsibilities of the various agencies. It identifies the existing mechanisms which can control or eliminate any possible adverse impacts. This chapter also identifies significant impacts in each resource area which remain for further investigation and mitigation through the USEPA NEPA compliance program.

3.1 USEPA'S REGULATORY RESPONSIBILITIES

3.1.1 New Source Coal Mining Activities Under the NPDES Permit Program

Section 511(c)(1) of the Clean Water Act stipulates that the issuance by USEPA of a New Source NPDES permit is a major Federal action subject to the review provisions of NEPA. NPDES regulations originally addressed coal mines as existing sources of wastewater, focusing permit review on the attainment of minimum effluent limitations. The draft New Source Performance Standards (NSPS) for the coal mining point source category were issued 17 September 1977 and activated the New Source NPDES permit program for the industry. The final standards were published 12 January 1979 (44 FR 2586), and amended on 28 December 1979 (44 FR 76788) and 13 October 1982 (47 FR 45382). The following types of coal mining facilities have been defined as New Sources and require NEPA review:

- Coal preparation plant and associated area, the construction of which is commenced after 13 October 1982.
- A surface or underground mine, the construction of which is commenced after 29 May 1981; or
- A surface or underground mine that USEPA determines is a "major alteration" after taking into account whether it:
  - Begins to mine a new coal seam.
  - Discharges effluent into a new drainage basin.
  - Causes extensive new surface disruption.
  - Begins construction of a new shaft, slope, or drift.
  - Acquires additional land or mineral rights.
  - Makes significant additional capital investments.
  - Otherwise has characteristics deemed appropriate by the Regional Administrator to place it in the New Source category.

The decision regarding whether a mine constitutes a New Source is determined for each individual project based largely on the information supplied with the permit application. At a minimum, New Source coal mines must meet the New Source Performance Standards for the industry if they propose to discharge wastewater into the surface waters of the United States. The effluent limitations apply to discharges from active mining areas as well as to post-mining discharges for both surface and underground mines. The post-mining limitations apply until release of the performance bond required by SMCRA.

Each New Source coal mine as described above must obtain an NPDES permit prior to commencement of point source discharge(s) from the site. The issuance of an NPDES permit is subject to the NEPA review process described in Section 3.1.3. The NEPA review requirement during the permit process allows: (1) public and interagency input to the NPDES permit review process prior to the initiation of mine site discharges; (2) effective environmental review and consideration of alternatives that may avoid or minimize adverse effects; and (3) development of environmentally protective permit conditions. This review may include a full Environmental Impact Statement (EIS) and/or various less extensive forms of environmental review and mitigation.

Federal regulations and laws applicable under the provisions of NEPA protect many environmental resources including the following:

- surface water and groundwater quality
- sensitive ecosystems
- floodplains
- wild or scenic rivers
- wetlands
- endangered species habitat
- environmentally significant agricultural lands
- recreational land uses
- noise and vibration levels
- historic, archaeologic, and paleontologic sites
- community integrity and quality of life
- air quality
- geologic and soil characteristics

Under the provisions of NEPA, USEPA is required to make every reasonable effort to preserve and enhance the quality of the environment through the protection of these resources. The level of protection afforded each resource area is discussed in more detail in Chapter 4.0.

3.1.2 Regulatory Timetable and Existing NEPA Implementation Procedures

USEPA follows a multi-step procedure for NEPA compliance. This procedure includes provisions for: (1) the early identification of candidate New Source applicants; (2) an initial request for information from each New Source permit applicant; (3) a preliminary NEPA/NPDES decision either to prepare an EIS or to defer the EIS preparation pending the review of additional information (if needed), preparation of an Environmental Information Document (EID), or a third party EIS; (5) a final decision to prepare an EIS or to issue a finding of no significant impact (FONSI) based on an EID or other information available; (6) the preparation of an EIS (if necessary) or the issuance of a FONSI; (7) public review and comment of a draft New Source NPDES permit with appropriate permit conditions; and (8) the issuance or denial of a final New Source NPDES permit. This decisionmaking process is shown schematically in Figure 3.1-1.

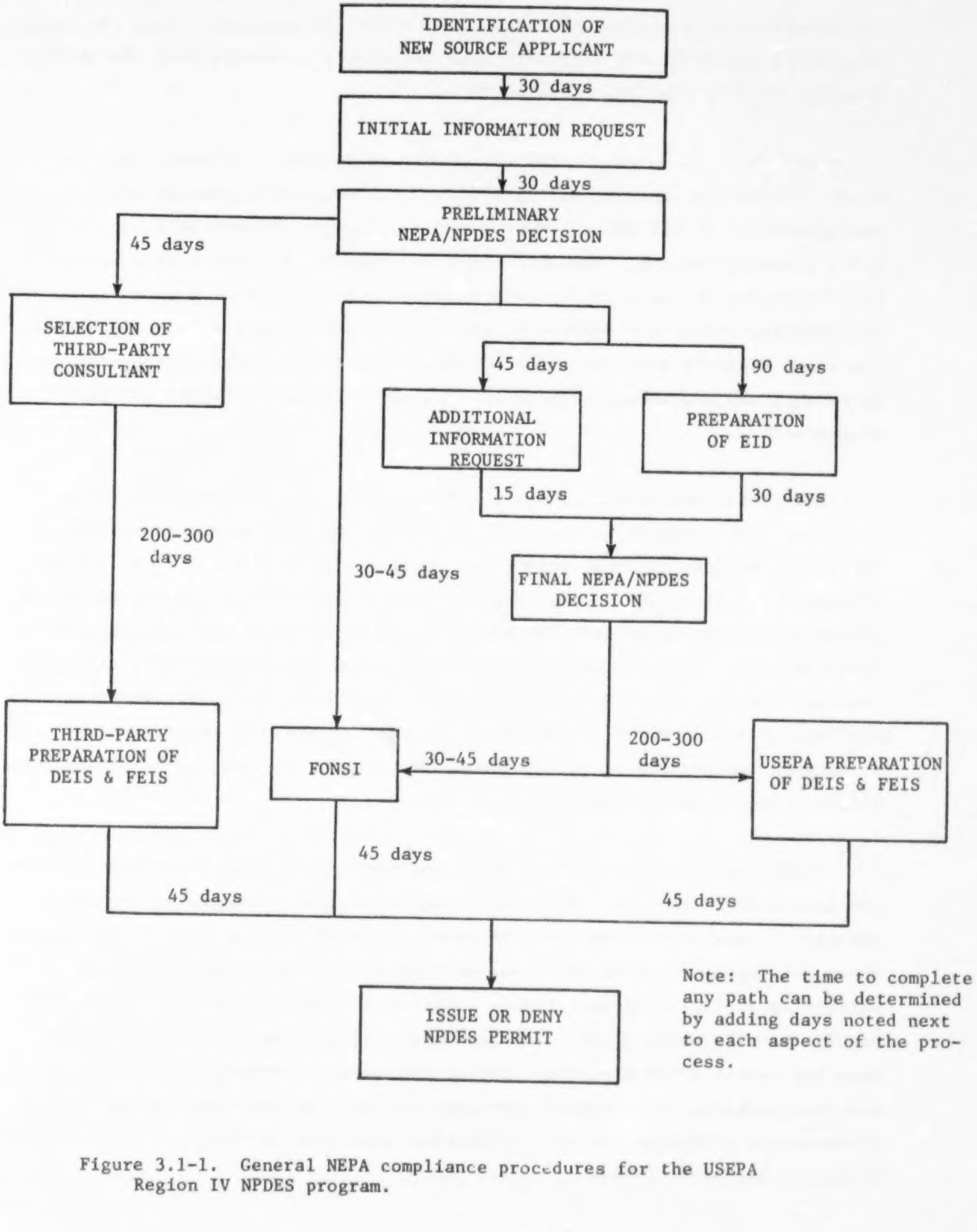
3.2 OSM's REGULATORY RESPONSIBILITIES

3.2.1 The Surface Mining Control and Reclamation Act

The major goals of the Surface Mining Control and Reclamation Act (SMCRA) as passed in 1977 are:

- to set a national standard and define a detailed program for mining coal and reclaiming land;
- to prohibit mining in areas where reclamation is not feasible;
- to maintain a balance between the agricultural productivity of land, the need for coal resources, and protection of the environment;
- to allow the public to participate in decisions affecting the environment which might be affected by coal mining; and
- to achieve reclamation of previously mined and abandoned lands.

The Federal government has taken the lead in establishing a national surface mining regulatory program through the Office of Surface Mining (OSM). A primary purpose of SMCRA, however, is to assist the states in developing and implementing a state regulatory program (Section 102(g)). Consequently, SMCRA authorizes the transfer of responsibility and authority to the states through


IDENTIFICATION OF NEW SOURCE APPLICANT
30 days
INITIAL INFORMATION REQUEST
30 days
PRELIMINARY NEPA/NPDES DECISION
45 days
SELECTION OF THIRD-PARTY CONSULTANT
45 days
90 days
ADDITIONAL INFORMATION REQUEST
PREPARATION OF EID
15 days
30 days
200-300 days
30-45 days
FINAL NEPA/NPDES DECISION
THIRD-PARTY PREPARATION OF DEIS & FEIS
FONSI
30-45 days
200-300 days
USEPA PREPARATION OF DEIS & FEIS
45 days
45 days
45 days
ISSUE OR DENY NPDES PERMIT

Note: The time to complete any path can be determined by adding days noted next to each aspect of the process.

Figure 3.1-1. General NEPA compliance procedures for the USEPA Region IV NPDES program.

the submittal of a program by each state to OSM for approval. Once the state program is approved, OSM will work with the states to ensure that the mining programs fulfill the objectives of SMCRA.

Kentucky's proposed program was submitted to OSM in December 1981 and final approval is expected during 1982. Once Kentucky is granted primacy, implementation of the mining control and reclamation program will be the State's responsibility. OSM will continue, however, to have a role by: (1) conducting an oversight program to ensure that the State program is operating satisfactorily; (2) regulating mining on Federal lands within Kentucky in the event Kentucky does not elect to enter into a State/Federal Cooperative Agreement; and (3) identifying imminent hazards to public health and the environment.

The SMCRA regulations of the interim Federal program remain in effect until the State program is approved, however. The regulations governing activities subject to SMCRA were first published 13 December 1977 as interim standards (42 FR 62630). These interim regulations will be superseded by the permanent regulatory program (44 FR 15313, 13 March 1979) and the approved State program. The permanent program regulations are substantially different from the interim regulations; the latter include only those environmental performance standards of 30 CFR Parts 715 through 718, the inspection and enforcement procedures of 30 CFR Parts 720 through 723, and the reimbursements to the State of 30 CFR Part 725.

SMCRA regulates all surface mines and many underground mines that require New Source NPDES permits. SMCRA also regulates most freestanding coal preparation plants located outside the permit areas of active mines. Underground mines are regulated under SMCRA unless they disturb less than 2 acres of surface lands including haul roads. Substantial exploration activities also require permits under SMCRA. The permanent regulations of OSM would apply existing source NPDES discharge limitations to areas undergoing reclamation and revegetation. OSM expects eventually to use the USEPA New Source limitations as the standards for all reclamation regulated by SMCRA (43 FR 181:41744-41745, 18 September 1978).

3.2.2 Mining Performance Standards Under SMCRA

By the authority designated in Title V of SMCRA, the Federal regulations which implement SMCRA set forth minimum performance standards describing how coal must be mined and the reclamation activities required to protect the environment and public health. Title V establishes the requirements and procedures to be used by the appropriate state or Federal agency responsible for controlling the environmental impacts of surface coal mining, the surface effects of underground mines, and coal exploration activities. Provisions for mining permits, reclamation plans, performance bonds, and public hearings are also included in Title V.

3.3 MSHA's REGULATORY RESPONSIBILITIES

The Coal Mine Health and Safety Act (CMHSA) is Federal legislation intended to improve mine safety. This Act established the Mine Safety and Health Administration (MSHA) as the regulatory authority for ensuring mine safety. The Act also authorized the implementation of regulations requiring approval of mining ground control plans and detailed operational and design standards for underground and surface mines and coal preparation plants.

MSHA is responsible for assigning an identification number by county to all surface and underground coal mines. Although a particular mine operator may have more than one operational mine within a county, only one identification number will be assigned to that operator. MSHA does not in the course of its requirements issue a permit to mine. Instead, the identification number is used as a means to identify the person responsible for a particular mining operation and as a reference during inspections. This number also is used in citations for violations and required legal action.

3.4 STATE REGULATORY RESPONSIBILITIES

The Commonwealth of Kentucky is actively regulating coal mining activities through their Bureau of Surface Mining Reclamation and Enforcement (BSMRE). Other State agencies also exercise various levels of control over certain mining or mining-related activities. In addition, both USEPA in the NPDES regulations and OSM in the SMCRA provisions have established procedural mechanisms and minimum regulatory standards for transferring program implementation and enforcement responsibilities to the State. Although Kentucky has not yet received approval for either of these functions, the State is pursuing the delegation of both of these regulatory programs.

3.4.1 NPDES Delegation to Kentucky

Section 306(c) of the Clean Water Act (CWA) enables each state to develop and submit to the Regional Administrator a procedure under state law for applying and enforcing standards of performance for New Sources located in each state. If USEPA finds that the procedures and laws of the state require the application and enforcement of standards of performance to at least the same extent as required by Section 306 of CWA, the state can be authorized to administer the NPDES program.

Under current NPDES regulations, the state's program submission must contain the following elements:

- a letter from the Governor requesting program approval;
- a state Attorney General's statement indicating that the state has the legal authority to carry out the program and that the laws designed to implement the program provide adequate authority to do so;
- a Memorandum of Agreement between USEPA and the state including provisions for transfer of pending permit applications, USEPA permit review functions, state reporting requirements, the state enforcement program, joint processing procedures, and USEPA review waivers;
- a complete program description including state permitting procedures, program organization, priorities for permit issuance, priorities for enforcement, funding arrangements, personnel qualifications, and implementation procedures;
- copies of the state's permit application and permit forms; and
- copies of all applicable state statutes and regulations.

Upon approval by USEPA, the NPDES program may be delegated to the state subject to the review, reporting, and coordination requirements of the Memorandum of Agreement. More than one state agency may have authority to administer aspects of the NPDES permit program, but each relevant agency must have statewide jurisdiction over a class of activities. Proposed USEPA revisions to the NPDES regulations are unlikely to alter these program requirements substantially. Several additional features may be required of the state programs in the future, however, including use of USEPA's standard discharge monitoring report forms, assumption of permitting and enforcement activities for Federal facilities, and implementation of best management practices and pre-treatment programs. If the NPDES permit program is delegated to the state, NEPA review requirements are not applicable because NPDES permit issuance by a state does not constitute a Federal action.

The current status of Kentucky's efforts to receive delegation of the NPDES program is uncertain. The Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) through its Division of Water is negotiating NPDES delegation with USEPA Region IV. It is likely that NPDES delegation will be granted to Kentucky during FY 1983.

3.4.2 SMCRA Primacy to Kentucky

SMCRA contains provisions for enforcement of the environmental performance standards by the state if the state can demonstrate that it can satisfactorily fulfill this function. In order to obtain primacy from OSM, Kentucky must submit an application to OSM indicating that the state program has a basis in state law and a set of procedures and regulations that are adequate to enforce the Federal standards. Under Federal stipulations, Kentucky's proposed laws and regulations must be no less stringent than the Federal model but may be more stringent. After reviewing the program, OSM can either accept and approve the State program or it can adopt and implement its own program for the State. If the OSM program is implemented, the State may submit a new application.

Once Kentucky is granted primacy, OSM will still exercise certain responsibilities under SMCRA. OSM is required to monitor the State's enforcement of the program on a regular basis and evaluate the State's administration of the program at least annually. Should the State not meet OSM's requirements in carrying out the program, OSM can implement and enforce its own program within the State. OSM will retain regulatory control over coal mining on Federal (and Indian) lands unless the State submits and has approved a State/Federal Cooperative Agreement which permits the State to regulate surface coal mining activities on Federal lands.

Kentucky's proposed program was first submitted to OSM in March 1980. In order to submit the program, the Kentucky General Assembly passed during the 1980 session House Bill 566 which amended KRS 350 and established adequate legal authority for assuming primacy. The General Assembly mandated, however, that Kentucky requirements are to be no more stringent than the minimum Federal standards. The proposed program was returned to the State for various revisions. A court injunction, however, delayed further review of the program and its final approval. The revised program was finally submitted to OSM in December 1981 and final approval with several conditions was received in early 1982.

3.4.2.1 Permit Application Requirements and Review

Applications for permits are required for both exploratory and surface mining activities. The application process is initiated by the applicant in one of the Regional Offices of the Kentucky Department for Surface Mining Reclamation and Enforcement located in Middlesboro, Jackson, Prestonburg, Pikeville, London, and Grayson. The preliminary application submitted by the applicant includes information pertaining to the following items:

- location and operation of the mining area;
- coal seam information;
- type of disturbance;
- proposed postmining land use changes;
- watershed data;
- surface and underground water monitoring;
- air quality;
- fish and wildlife studies; and
- geologic information.

Upon receipt of the preliminary application, an application number is assigned.

A preliminary review of the proposed site is conducted by the Regional Office within 21 days of receipt of the preliminary application. Simultaneously, a review is conducted to determine the specific data available and the additional studies which will be required. At this time, a decision will also be made regarding the lands unsuitable review. Upon completion of these reviews, a preliminary review worksheet is prepared and a bond amount assigned. If sufficient information exists to complete a full application and there are no reasons to prevent mining in the proposed permit area, the applicant is advised to proceed with the full application. All of this information is then filed with the Central Office.

The full permit application is submitted to the Regional Office for administrative review. The basic information requirements are as follows:

- type of mining and annual coal production;
- location, watershed, and county of proposed mining activity;
- acreage to be disturbed, by type;
- cultural or historic areas on site;
- required variances or special provisions;
- adjacent land uses including Federal or State parks, US Corps of Engineers flood control reservoir projects, and active deep mines;
- average slope of permit area;
- overburden analysis;
- identification of aquifers, present users and condition, and potential mining effects;
- identification of surface waters, measured discharges, water quality, and uses;
- range of diversity indices for fish and macroinvertebrate data at each aquatic sampling station;
- disturbance of wetland areas or endangered species habitats;
- premining and postmining land uses; and
- presence of prime farmland.

When the application is deemed administratively complete, it is forwarded to the Central Office where it undergoes an accuracy review. It is at this point that appropriate Federal, State, and local agencies are notified of the application. These agencies and their areas of concern include:

Local

- City or County Government - public parks
- Area Development District - historic sites, public parks and buildings

State

- KNREPC - Division of Hazardous Materials and Waste Management - RCRA compliance
- KNREPC - Division of Water - CWA compliance, coal preparation plants, and dam construction
- Kentucky Department of Transportation - transportation plan
- Kentucky Heritage Commission - historic sites and places
- KNREPC - Division of Air Pollution Control - compliance with Clean Air Act
- KNREPC - Office of Policy and Program Analysis - lands unsuitable for mining determination
- Kentucky Fish and Wildlife Commission - fish and wildlife impacts
- State Archaeologist - places of archaeological significance

Federal

- US Forest Service - permit application review within National Forest boundaries
- US Fish and Wildlife Service - fish and wildlife impacts
- US Army Corps of Engineers - permit application review within Corps watershed
- US Soil Conservation Service - prime farmland restoration
- US Environmental Protection Agency - water quality

Once the permit application has been administratively accepted by the Division of Permit's Frankfort Office and the Administrative Review Section Supervisor has notified each outside agency of the permit filing, each agency is allowed thirty (30) days to make comments (and/or to request further information). Necessary arrangements for each agency's review are subsequently made. The Administrative Review Section Supervisor additionally coordinates the date, time, and location of all information conferences requested by any other Federal, State, or local government agency on a particular mining application.

All public and agency comments are compiled and forwarded to the applicant and the Regional Office from which the application is sent to the Technical Review Section. The technical review consists of a determination that all requirements of the regulatory program are fulfilled including a determination of the probable cumulative impacts. At this point, conditions or operating limitations may be appended to the application. This review will result in a final recommendation of: (1) permit denial; (2) permit issuance; or (3) permit withdrawal. A final check on lands unsuitable determinations is also made at this time. This information is then included in the final review along with other considerations such as final checks on the performance bond and notice of intent to mine.

3.4.3 Other State Laws Regulating Coal Mining Activities in Kentucky

Due to the prevalence of coal mining activities in Kentucky, a number of other State laws have been enacted which regulate various aspects of the coal mining industry. Specifically, the relevant statutes and regulations are as follows:

Statutes

KRS 42 and 177 - Local Government Economic Assistance
KRS 146 - Wild Rivers System; Nature Preserves
KRS 151 - Geology and Water Resources; Floodplains Protection
KRS 224 - Water Pollution Control; Air Pollution Control
KRS 350 - Kentucky Surface Mining Law
KRS 352 - Mining Health and Safety

Regulations

401 KAR

Chapter 2 - Solid Waste
Chapter 4 - Water Resources
Chapter 5 - Water Quality
Chapter 63 - General Standards of Performance

405 KAR

Regulations for Surface Mining and Reclamation Operations and Coal Exploration Operations

805 KAR

Chapter 3 - Surface Mining Safety Standards
Chapter 5 - Explosives and Blasting

These laws would be in effect even if the State or Federal SMCRA regulations were overturned or weakened by future litigation. The following sections briefly summarize the level of protection and permits required under these laws.

3.4.3.1 Kentucky Statutes

Under Kentucky Revised Statutes (KRS) 42.330 and 177.960, the State adopted the Local Government Economic Assistance Act which provides an allocation formula for the coal severance tax collected by the Kentucky Department of Revenue on all coal produced in the State. Any funds in excess of $177.6 million are to be divided equally between the State and local governments. Coal-producing counties receive 90% of the local share and coal impact counties (i.e., those counties with no active mines but through which coal is transported) receive 10%. The Act establishes ten priority areas for the use of these funds including health, recreation, libraries, social services, government administration, economic development, and vocational education.

Under KRS Chapter 146, the State has been divided into nine soil and water conservation areas. This statute also establishes the Division of Soil and Water Conservation within KNREPC. Title 146.200 establishes the Wild Rivers System in order to preserve certain designated streams in their free-flowing condition and to prevent future infringement on their beauty caused by impoundments or other man-made works. No mining is allowed within the boundaries of a designated stream including at least the visual horizon from the stream but not more than 2,500 feet from the center of the stream. This boundary also includes access points at the upstream and downstream boundaries of the area.

KRS Chapter 151 establishes the Kentucky Geological Survey to aid the State in developing its mineral resources. Title 110 of this chapter sets forth the State's water resources policy: to prohibit pollution; maintain normal streamflow; prevent flooding; regulate construction, operation, and maintenance of dams; prevent obstructions from dumping; and to conserve and properly develop the water resources. Pursuant to this statute, KNREPC's Division of Water requires that a permit application be completed for construction or alterations of dams and for the withdrawal of water. The Division of Water must notify the applicant within 20 working days after receipt of the application whether the permit will be issued. This Chapter also establishes State regulations requiring a permit for construction activities in the 100-year floodplain of streams.

KRS Chapter 224 establishes KNREPC as the regulatory authority to implement controls on septic tanks, solid waste disposal, air pollution, and noise. It also establishes the State as a member of the Ohio River Valley Sanitation Compact, the Tennessee River Basin Water Pollution Control Compact, the Interstate Compact on Air Pollution, and the Interstate Environmental Compact. These interstate agreements were created to control air and water pollution problems between states with common boundaries. Section 6 of Title 033 of this chapter also gives KNREPC the power to control and regulate strip mining and reclamation in accordance with KRS Chapter 350.

KRS Chapter 350 establishes Kentucky's Surface Mining Law and provides the authority for regulating surface mining activities in the State. The chapter also establishes the Department for Surface Mining Reclamation and Enforcement (DSMRE) within the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC). Chapter 350 provides the primary statutory authority for Kentucky's permanent mining program. Aspects of the statute were revised by the 1980 General Assembly pursuant to Federal requirements for Kentucky's permanent regulatory program.

Mining health and safety regulations are established under KRS Chapter 352 which includes numerous provisions relating to both surface and underground mining. The regulations are primarily directed to mine safety and health although some baseline data concerning mine maps, coal bed dip, oil and gas well locations, water pools, hazardous areas, land ownership, property lines, elevations, and contours are required.

3.4.3.2 Kentucky Regulations

A number of regulations have been enacted to implement the statutes governing various activities related to coal mining in Kentucky. KNREPC is the designated agency in Kentucky responsible for enforcing these regulations. The following information summarizes those regulations.

401 KAR 2:010	Solid Waste	Regulations controlling landfills and reporting procedures.
401 KAR 4:010	Water Resources	Requirements and reporting procedures for permits to withdraw water.
401 KAR 4:020	Water Resources	Permit exemption for Department of Defense retention structures.
401 KAR 4:030	Dams	Minimum design criteria for dams and associated structures in Kentucky.
401 KAR 4:040	Impoundments	Requirements for certification of plans for embankments greater than 25 feet in height or having an impounding capacity of 50 acre-feet.
401 KAR 5:026	Water Quality	Classification of waters by priority and point source.
401 KAR 5:029	Water Quality	Definition of water quality terminology.
401 KAR 5:031	Water Quality Aquatic Wildlife	Water quality standards for protection of cold and warm water aquatic life.
401 KAR 5:031	Water Quality	Aquatic life 24 hr. pH not less than 6.0; pH not more than 9.0. Sets flow and temperature limits. Total suspended solids (no specified limits).
401 KAR 5:035	Water Quality	Water treatment requirements for point sources.
401 KAR 63:005	Air Quality	Establishment of primary and secondary air quality standards.
805 KAR 3:010	Mine Safety	Safety standards for coal and clay mines.

805 KAR 3:020	Mine Safety	General safety standards for coal and clay mines.
805 KAR 3:030	Mine Safety	Safety standards and ground control plans.

The major aspects of the State regulations for implementing the permanent program granted to Kentucky are listed below:

405 KAR 7:040E	General obligations of operators and permittees
405 KAR 7:060E	Experimental practices mining
405 KAR 7:080E	Small Operators Assistance
405 KAR Chapter 8	Permits
405 KAR Chapter 10	Bond and issuance requirements
405 KAR Chapter 12	Inspection and enforcement
405 KAR Chapter 16	Performance standards for surface mining activities
405 KAR Chapter 18	Performance standards for underground mining activities
405 KAR Chapter 20	Special performance standards
405 KAR Chapter 24	Areas unsuitable for mining

Table 3.4-1 summarizes the various Kentucky statutes and regulations in relation to the areas of environmental protection provided by them in regard to coal mining activities.

Table 3.4-1. Environmental resources addressed by Kentucky statutes and regulations related to coal mining activities.

	STATUTORY AUTHORITY						REGULATORY AUTHORITY		
	KRS 146 (Wild Rivers System)	KRS 151 (Geol. & Water Res.)	KRS 177 (Local Government Assistance)	KRS 224 (Water Pollution & Air Pollution Control)	KRS 350 (Surface Mining)	KRS 352 (Mine Safety and Health)	401 KAR (Environ. Protection)	405 KAR (Surface Mining)	805 KAR (Mining Safety and Health)
Surface & groundwater quality	X	X		X	X	X	X	X	
Sensitive ecosystems	X								
Floodplains	X	X			X		X	X	
Wild & scenic rivers	X							X	
Wetlands	X				X			X	
Endangered species habitats	X				X			X	
Significant agricultural lands					X			X	
Recreational land uses	X				X			X	
Noise and vibration levels				X	X		X	X	
Historic, archaeologic, or paleontologic sites	X				X			X	
Community integrity and quality of life			X	X	X	X	X	X	X
Air quality				X	X		X	X	
Geologic and soil characteristics	X	X			X	X		X	X

4.0 IMPACTS OF MINING ACTIVTIES AND LEVEL OF PROTECTION PROVIDED BY EXISTING REGULATIONS

The environmental impacts associated with coal mining and associated activities and the existing State and Federal regulations that provide protection for environmental resources are described in this chapter. Impacts that are not mitigated by regulations of other Federal or State agencies are identified for further consideration by USEPA.

4.1 EARTH RESOURCES

The construction and operation of coal mines, haul roads, loadout facilities, and coal preparation plants can cause impacts on local earth resources. The major concerns of mining impacts on earth resources center on steep and unstable slope conditions, toxic overburden, and floodplain conditions.

4.1.1 Steep and Unstable Slopes

Mining or related activities which occur on steep or unstable slopes, slopes greater than 20°, or lesser slopes that are underlain by bedrock of low bearing strength or other poor geotechnical quality have a high probability of causing damaging landslides. Activities which result in the placement of spoil on downslopes, the elimination of highwalls, or the disturbance of land above the highwall directly threaten those activities in the paths of potential landslides.

OSM Regulations

A number of provisions of SMCRA provide for the protection of existing geologic and soil characteristics and for the prohibition of mining on potentially hazardous areas. Under the SMCRA program, protection of geologic and soil characteristics is provided through provisions relating to topsoil handling, elimination of highwalls, return of the land surface to approximate original contour, subsidence controls for underground mining, woody material disposal restrictions, downslope spoil disposal restrictions, and standards for head-of-hollow and valley fills.

Under the permanent SMCRA program, the regulatory authority has the power to prohibit mining activities on areas with unstable geologic characteristics. SMCRA regulations (30 CFR Part 826) apply special performance standards to mining on slopes of 20° or more (although the regulatory authority may define areas less than 20° as steep slopes based upon soil, climate, or other considerations). The SMCRA standards of this section do not apply where mining is done on a flat or gently rolling terrain with an occasional steep slope through which the mining proceeds and leaves a plain or predominantly flat area or where mining is governed under Section 824. Nevertheless, the permanent program performance standards regulate: the placement of spoil materials on downslopes; the elimination of highwalls; the disturbance of land above the highwall; the use of woody material as fill material; and the construction of unprotected drainage channels in backfills (30 CFR 826.12). Variances from the requirement to return land to the original contour may be granted in accordance with 30 CFR 785.15-785.16.

Kentucky Regulations

State regulations require that a permit be obtained for all strip mining activities in the State (405 KAR 8:030E). Such a permit may be denied if the underburden is expected to cause unsolvable problems with substantial deposition of sediment in streambeds or with landslides. Under the permanent State program, performance standards have been established for mining on slopes of 20° or more (405 KAR 20:060E). Like the Federal program, Kentucky regulates: the placement of spoil or waste materials on downslopes; the elimination of highwalls; the disturbance of land above the highwall; the use of woody materials as fill material; and the construction of unprotected drainage channels (405 KAR 20:060 Section 2). State law also requires that all land be restored to its original contour with highwalls and spoil banks eliminated (KRS 350.410). The State does, however, allow for a variance from the original contour requirement for steep slopes. The variance may be granted to: (1) improve watershed control of lands within the permit area and adjacent lands; or (2) make the land within the permit area suitable for an industrial, commercial, residential, or public use (405 KAR 8:050E Section 5).

4.1.2 Toxic Overburden

The disturbance of overburden materials that are toxic or acidic has the potential for causing adverse environmental impacts. Exposure of such strata to water and the atmosphere can result in the formation of acid mine drainage and leaching problems. The lowering of the pH of groundwater and surface runoff can cause toxic substances in the overburden to be carried into the groundwater and surface water systems.

OSM Regulations

SMCRA requires coal operators to use the best control technology currently available to treat acid and other toxic mine drainage [Section 515(6)]. Discharges from disturbed areas must ordinarily meet effluent standards established by OSM. Drainage from acid-forming and toxic-forming spoil into ground and surface waters is controlled by both interim and permanent SMCRA regulations which are designed to protect the hydrologic balance (30 CFR 816.48). Both regulatory programs vest the agency with the power to determine when certain activities are detrimental to water quality and the surrounding environment.

Kentucky Regulations

The permanent Kentucky program requires permittees to avoid drainage from acid-forming and toxic-forming spoil by: identifying, burying, and treating spoil determined to be detrimental to vegetation or water quality; preventing water from coming into contact with acid-forming or toxic-forming spoil; and burying or treating such spoil within 30 days after initial exposure on the mine site (405 KAR 16:060E Section 4). In addition, the Kentucky Environmental Protection Act establishes a general prohibition against the discharge of any substance that shall cause or contribute to the pollution of the waters of the Commonwealth (KRS 224.060).

4.1.3 Floodplains

Certain mining operations such as coal preparation plants and loadout facilities may encroach upon floodplains and cause modifications to the hydrologic capacity of neighboring streams and result in the back-up of flood waters upstream. Also, sediment which runs off of mined lands reduces the flood-carrying capacity of streams. When the same magnitude flood must cover a larger area due to the reduction in water-carrying capacity of a stream channel, adverse economic and social impacts may result from the damages caused by the higher flood waters.

OSM Regulations

The permanent SMCRA program sets forth provisions for designating areas as unsuitable for mining. Within these provisions, the regulatory authority can prohibit mining in areas where natural hazard lands are affected including areas subject to frequent flooding. Under the permanent program, stream buffer zones are established for land within 100 feet of an intermittent or perennial stream (30 CFR 816.57). The permanent regulations do not, however, specifically protect the 100-year floodplain.

USEPA Regulations

Undeveloped floodplains are protected by Executive Order 11988 as implemented by guidelines of the Water Resources Council (43 FR 29:6030-6055, 10 February 1978). USEPA, under the provisions of Executive Order 11988, must avoid wherever possible the long- and short-term impacts associated with the occupancy and modification of floodplains and avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The Agency must also incorporate floodplain management goals into its planning, regulatory, and decisionmaking processes. To the greatest extent possible, USEPA must:

- reduce the hazard and risk of flood loss and, wherever it is possible, avoid direct or indirect adverse impacts on floodplains;
- where there is no practical alternative to locating in a floodplain, minimize the impact of floods on human safety, health, and welfare as well as the natural environment;
- restore and preserve natural and beneficial values served by floodplains;

- require the construction of USEPA structures and facilities to be in accordance with the standards and criteria of the regulations promulgated pursuant to the National Flood Insurance Program;
- identify floodplains which require restoration and preservation, recommend management programs necessary to protect these floodplains, and include such considerations as part of on-going planning programs; and
- provide the public with early and continuing information concerning floodplain management and with opportunities for participating in decisionmaking including the evaluation of tradeoffs among competing alternatives.

Kentucky Regulations

The permanent Kentucky program, like the final OSM regulations, establishes stream buffer zones for land within 100 feet of a perennial stream or a stream with a biological community as determined according to 405 KAR 16:060 Section 11(3). These zones are not to be disturbed by surface mining operations unless authorized by KNREPC pursuant to 405 KAR 16:060E Section 11 and 405 KAR 18:060E Section 9. The Division of Water of KNREPC also requires a permit for the construction, reconstruction, relocation, or improvement of any building, dam, embankment, levee, bridge, dike, fill, or any obstruction across or along any stream, floodway of any stream, or 100-year floodplain (KRS 151.250). All permit applications must include a cross section of the affected streambed. If any building exists within 1,000 feet of the proposed obstruction, cross sections of the floodway at the building must also be submitted indicating the first floor elevation. While the specific criteria for issuing the floodway permit varies with the type of construction proposed, the major stipulation for all activities is the prohibition of any activity which would result in raising the 100-year flood level more than one foot. Certain activities are exempt from floodway permit review, the most significant being the exemption of activities which locate where the watershed area is less than one square mile.

4.1.4 Level of Protection for Earth Resources

Existing regulations provide an adequate level of protection against impacts to the earth resources of western Kentucky. Impacts on steep and unstable slopes are subject to the provisions of both State and Federal performance standards. Toxic overburden is adequately regulated by OSM and Kentucky regulations. Permittees are required to take action to avoid drainage from acid-forming and toxic-forming spoil. Floodplains are generally protected by the OSM and Kentucky requirement of a stream buffer zone of 100 feet. State regulations also require a permit for construction in floodplains and prohibit activities which increase existing flood heights more than one foot, increase water velocities, and flood upstream structures. Because Federal and State agencies provide adequate protection for earth resources, further consideration of these areas by USEPA pursuant to NEPA responsibilities is not required.

4.2 WATER RESOURCES

The mining of coal from surface and underground mines in the Western Kentucky Coal Field has resulted in the degradation of surface water and groundwater resources of the Coal Field. Future mining activities may affect water resources by further degrading the quality of the water and by reducing the quantity of available water supplies.

4.2.1 Surface Water

Surface mining and the surface portions of underground mining affect the hydrologic characteristics of an area by reducing peak flood flows and by increasing base flows. The land disturbances associated with mining activities result in the on-site ponding of rain water which would otherwise run naturally into streams. The quality of surface water is affected by mining activities through the introduction of high iron and manganese concentrations, acid mine water, and high sediment loads. The erosion of exposed soil, coal refuse piles, and coal storage piles and overflow from sedimentation ponds during storm events result in the release and transport of sediment, toxic substances, and other water quality reducing elements to streams.

OSM Regulations

Many of the provisions of SMCRA are designed to protect hydrologic balance--water quality, quantity, and the location of surface channels and streams (30 CFR 816.41-816.57). The permanent program performance standards require that the permittee plan and conduct coal mining and reclamation operations so as to minimize changes to the prevailing hydrologic balance in both the permit area and adjacent areas and to prevent long-term adverse changes in the hydrologic balance (30 CFR 816.41). The permittee is to emphasize those mining practices which prevent or minimize water pollution and changes in flow over the use of water treatment facilities. Coal mining operators not only face requirements concerning mining methods, but also must initiate monitoring systems to prove they are not adversely affecting the hydrologic balance (30 CFR 816.52). Several general methods established for protecting the hydrologic balance include diverting runoff, planting vegetation, regulating channels, and mulching.

All surface drainage from disturbed areas that have been graded, seeded, or planted must be maintained until revegetation requirements are met and untreated drainage for disturbed areas complies with applicable water quality standards (30 CFR 816.42). Discharges must meet USEPA's NPDES effluent standards. Any legitimate water supplies which are contaminated, diminished, or interrupted must be replaced. The permittee is required to monitor surface water quantity and quality and to make regular reports to either the regulatory authority designated under SMCRA or the authority designated under the NPDES permit program (30 CFR 816.52).

Where treatment of mine water is necessary, it must continue as long as water quality problems exist. A major feature of SMCRA is the requirement that all surface drainage from the disturbed area pass through a sedimentation pond or series of ponds before leaving the area (30 CFR 816.42). SMCRA regulations establish both design and performance standards for sedimentation ponds (30 CFR 816.46).

Regulations have also been established regarding the diversion of streams and surface runoff, channel lining, sediment control, and spoil disposal (30

CFR 816.44-816.48). The diversion channel must be approved by the appropriate regulatory authority. Regulations require that permanent diversion channels be lined. Sediment control measures must incorporate the best technology available to prevent additions of sediment to streams. To avoid contamination and runoff of water from acid or toxic forming spoil, an operator must bury and/or treat the spoil. Spoil must be buried within 30 days after it is first exposed although temporary storage may be permitted.

USEPA Regulations

The New Source Performance Standards (NSPS) finalized on 12 January 1979 and amended on 28 December 1979 and 13 October 1982 provide for effluent limitations for new coal mining activities based on the use of the best available demonstrated technology (BADT). Less stringent limitations are allowed for any discharge or increase in discharge caused by a storm event less than, equal to or greater than a 10-year, 24-hour precipitation event (or snowmelt of equal volume) which occurs within any 24 hour period. These alternate limitations are not available to discharges from underground workings at underground mines (unless commingled with surface area discharges), or to new source preparation plants which are subject to a zero discharge requirement.

Separate effluent limitations are provided for post-mining discharges from reclamation areas and abandoned underground mines, until release of the SMCRA performance bond.

Kentucky Regulations

The permanent Kentucky program establishes requirements for the protection of the hydrologic balance in the Western Kentucky Coal Field including requirements for the protection of surface water quantity and quality (405 KAR 16:060E - 16:110E). Like the Federal SMCRA program, surface mining activities must be planned and conducted to minimize changes to the prevailing hydrologic balance in both the permit area and adjacent areas in order to prevent long-term adverse changes in that balance (405 KAR 16:060E Section 1). The State regulations stipulate that in no case shall Federal and State water quality standards or effluent limitations be violated. Each permittee must emphasize mining and reclamation practices that prevent or minimize water pollution. Appropriate sediment control measures are to be designed, constructed, and maintained using the best technology currently available (405 KAR 16:060E Section 2).

Under the Kentucky program all surface drainage from disturbed areas must pass through a sedimentation pond or series of sedimentation ponds before leaving the permit area (405 KAR 16:070E). The ponds and any other treatment facilities must be properly maintained and are not to be removed until all disturbed areas in the drainage area above the facility have been backfilled, graded, and revegetated in accordance with the stipulations of 405 KAR 16:070E. KNREPC may exempt a permittee from the requirements only when: (1) the disturbed drainage area is small; and (2) the permittee demonstrates that the ponds and treatment facilities are not necessary for the drainage to be in compliance at all times with all applicable Federal and State water quality standards. State regulations have also been established regarding the diversion of surface runoff and stream channels, channel lining, and sediment control (405 KAR 16:080E-16:100E).

4.2.2 Groundwater

The major impacts of coal mining upon the groundwater resources of the Western Kentucky Coal Field is the migration of acid mine drainage into the groundwater and disruption of groundwater supplies. Several mining practices affect the formation of acid mine drainage and its migration into groundwater. Abandoned deep mines are the major source of acid mine drainage contamination in the region. These mines lie below the water table and provide for the free access of air to the shale and coal seams which contain iron disulfide minerals. Surface mines which have not been reclaimed or are presently in operation can produce acid mine drainage by the disposal of overburden downslope of a level bench and by the formation of pools of acid mine water. Auger mining consists of horizontally augering the coal seam along a highwall. Exposed auger holes are direct sources of mine drainage emissions and can cause subsurface water pollution through surface water inflow (USEPA 1975) and consequent infiltration. Local supplies of groundwater can be disrupted by mining operations. When mining operations must penetrate through aquifers to expose the coal seam, the natural flow of groundwater is altered. The supply of groundwater at local water wells may diminish or disappear as a result of such operations.

OSM Regulations

Pursuant to the permanent SMCRA regulations, attention must be given to the depth of groundwater resources, the location of surface drainage channels, and the design of sedimentation ponds (30 CFR 816.50-816.52). Reclamation must allow water to enter and recharge groundwater levels as it did before mining activities began. The recharge capacity is to be restored to a condition which supports an approved post-mining land use; minimizes disturbances to the prevailing hydrologic balance; and provides a rate of recharge that approximates the pre-mining recharge rate. The quantity and quality of groundwater resources must be monitored. Such monitoring must routinely assess infiltration rates, subsurface flow, and storage characteristics in a manner approved by the regulatory authority.

USEPA Regulations

Under the Safe Drinking Water Act, protection of groundwater resources is established through regulation of underground injection of hazardous wastes and control of public water supplies. The Act gives USEPA enforcement power in cases where contaminants are present or are likely to enter a public water system and may present an imminent and substantial danger to the public health and where the appropriate state and local authorities have not acted. Sludge produced from the treatment of acid mine drainage is the only waste from coal mining activities that currently falls under USEPA's definition of hazardous waste.

Kentucky Regulations

The Kentucky program requires surface mining activities to be conducted in a manner that facilitates reclamation which will restore approximate pre-mining recharge capacity and which will allow a recharge capacity that supports the approved post-mining land use (405 KAR 16:060E Section 5). Like the Federal SMCRA program, backfilled materials must be placed so as to minimize contamination of groundwater systems with acid, toxic, or otherwise harmful mine drainage and to minimize the adverse effects of mining on groundwater systems outside the permit area. In addition, groundwater monitoring is required for groundwater levels, infiltration rates, subsurface flow, and storage characteristics in a manner specified and approved by KNREPC (405 KAR 16:110E Section 1).

4.2.3 Level of Protection for Water Resources

Existing regulations provide adequate protection for most surface water resources. Especially sensitive water resources, however, may not receive the degree of protection necessary to maintain the aspect of the resource which deems it sensitive. Neither State nor SMCRA requirements control upstream discharges which may cause impacts on sensitive surface water segments located downstream. Further consideration of adverse impacts to surface water resources is required.

State and Federal regulations establish a groundwater protection program which requires coal operators to replace any contaminated or diminished water supplies. The responsibility, however, rests with the well owner to prove that the well has been impacted. In certain cases, individuals may not know their water is contaminated or may have to use the contaminated water until an alternative supply can be made available. The regulations are not designed to consider future impacts on off-site wells prior to the commencement of mining activities. Consideration of the impacts on specific off-site wells could prevent future contamination and reduce the need for replacing such sources of water. USEPA should consider this adverse impact to groundwater resources pursuant to its NEPA responsibilities.

4.3 BIOLOGICAL RESOURCES

The construction and operation of coal mines, haul roads, preparation plants, and other mining facilities can cause severe impacts on the biological resources of the Western Kentucky Coal Field. Direct effects may include elimination of terrestrial vegetative and wildlife habitats on mine sites (especially significant for strip mines) and elimination of aquatic life in receiving streams due to stream removal, increased sedimentation, or changes in water chemistry. Mining activities may also cause direct effects by producing changes in the hydrologic regime in the receiving streams. Wetland areas can also be adversely affected by these types of mining-related impacts.

4.3.1 Elimination of Terrestrial Habitats

Terrestrial habitats in the Coal Field may be affected by both underground and surface mining operations. Underground mining may result in the direct elimination or disturbance of terrestrial vegetation and associated animal communities at the mine mouth and along haul roads. Underground mining can also cause subsidence or changes in groundwater levels which may alter growth patterns and species composition of terrestrial vegetation. Surface mining may affect terrestrial communities by direct removal of vegetation or by alteration of the substrate. Coal removal alone is seldom the most important impact of surface mining, however, unless rare or endangered species are eliminated. More significant disturbances result from soil modification caused by overburden removal.

OSM Regulations

SMCRA regulations provide detailed revegetation requirements including timing of revegetation, mulching, and use of introduced species (30 CFR 816.111-816.117). The permanent SMCRA regulations require that the best available mining technology be used to minimize on-site disturbance of sensitive resources. All disturbed land, except certain water areas and surface areas of roads, must be seeded or planted to achieve a permanent vegetative cover of the same seasonal variety native to the region and capable of self-regeneration and plant succession (30 CFR 816.111). Surrounding biological habitats and potential off-site impacts are not regulated, however.

USEPA Regulations

The Fish and Wildlife Coordination Act of 1958 (PL 89-72) requires USEPA and any other Federal agency to consult and coordinate with the US Fish and

Wildlife Service when streams and other water bodies are altered. In addition, the US Department of Interior and the US Department of Agriculture as well as appropriate Kentucky agencies have the opportunity to comment on terrestrial ecosystem impacts during the New Source NPDES permit review process. Based on the comments received during the review process, USEPA can propose revisions to permit applications or suggest permit conditions that will mitigate impacts on terrestrial ecosystems, if necessary. In this way, USEPA can assist in the conservation and protection of terrestrial ecosystems.

Kentucky Regulations

The permanent Kentucky program establishes requirements for the revegetation of areas affected by surface mining activities. These requirements include stipulations regarding the temporary and permanent vegetative cover, use of introduced species, the timing of revegetation, mulching and other soil stabilizing practices, standards for measuring revegetation success, and reporting requirements (405 KAR 16:200E). Each permittee must establish on all affected land a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the region or species that support the approved post-mining land use. Areas determined to be of particular ecological importance or value may be designated by the Commonwealth as nature preserves and as such preempt mining activities within their boundaries.

4.3.2 Elimination of Aquatic Habitats

The major concerns regarding the possible effects of mining on aquatic habitats in the Western Kentucky Coal Field include: (1) direct elimination of additional wetlands, stream segments, and associated impacts; (2) disturbance of receiving streams, rivers, and wetlands by increased acid mine drainage and sedimentation in an area already significantly affected by previous mining activities; (3) potential impacts on remaining sensitive aquatic and wetland habitats; and (4) effectiveness of reclamation efforts in reducing or minimizing impacts on aquatic and wetland habitats. Surface mining activities in particular may result in the direct removal of stream segments and wetlands. Both streams and wetlands may also be signficantly affected by acid runoff, fertilizers, lime, and sedimentation from the mined areas during reclamation activities. Potential impacts primarily include changes in groundwater inflow and soil moisture levels, both of which may result in direct impacts on wetland vegetation or changes in species composition. Aquatic habitats and wetlands may already be significantly affected by acid mine drainage and sedimentation caused by post-mining activities. Sedimentation generally has the more significant potential impact on aquatic life due to increased erosion from mined areas and coal washing facilities (Haynes et al. 1979).

OSM Regulations

Aquatic habitats are protected indirectly through water quality stipulations and directly through SMCRA regulations which provide for review of mining activities by fish and wildlife agencies. Impacts to water quality are subject to permanent SMCRA regulations protecting the hydrologic balance (30 CFR 816) and these regulations also serve to protect aquatic habitats.

USEPA Regulations

Effluent limitations are established for the coal mining industry under the Clean Water Act and are administered by USEPA through the NPDES permit program. Implementation of the NSPS provides additional protection to aquatic ecosystems beyond the requirements of the existing source discharge limitations. The USEPA Administrator may impose even more stringent limitations where such are considered necessary to provide a greater degree of protection to sensitive aquatic ecosystems. These more stringent limitations may be appropriate for stream segments that include spawning grounds of game fish such as trout or the habitat of mussels endangered with extinction. The Administrator also may suggest permit conditions such as requirements for larger buffer areas adjacent to especially sensitive stream segments. Sediment control structures that provide more environmental protection than would be afforded by structures constructed under BACT also could be mandated. This imposition of more stringent limitations by the Administrator, however, has rarely been stipulated.

Kentucky Regulations

The permanent Kentucky program requires each permittee, to the extent possible using the best technology currently available, to minimize disturbances and adverse impacts of surface mining activities on fish, wildlife, and related environmental values, and to achieve enhancement of such resources where practicable (405 KAR 16:180E). Each permittee is required to promptly report to KNREPC the presence in the permit area of any critical habitat of a threatened or endangered species or any plant or animal listed by the Commonwealth of Kentucky as threatened or endangered. Additional requirements are established for preserving wetland areas and for establishing fish or wildlife habitats as primary or secondary post-mining land uses. In addition, particularly sensitive resources may be protected under Kentucky's regulation of areas unsuitable for mining (405 KAR Chapter 24).

4.3.3 Increased Sedimentation

Sedimentation may cause increased scouring in streams, shading of benthic plants, direct smothering of benthic invertebrates, or creation of unstable substrates unsuitable for animal colonization (Hart and Fuller 1974). The loss of benthic plants and animals typically results in elimination of fish from affected areas (Haynes 1970). Sedimentation may also directly affect fish by clogging gills, causing osmotic stress, smothering eggs deposited in the substrate, reducing disease resistance, or changing migratory patterns (Dvorak et al. 1977).

OSM Regulations

The permanent SMCRA regulations establish requirements regarding diversion of streams and surface runoff, channel lining, sediment control, and spoil disposal. Coal mining operators not only are required to meet performance standards concerning mining methods, but also must initiate monitoring systems to prove they are not adversely affecting the hydrologic balance.

USEPA Regulations

The NSPS for coal mining are administered by USEPA through the NPDES permit program. The standards are applied to discharged water from active mining areas and to post-mining discharges occurring during the reclamation process, until release of the performance bond required by SMCRA.

Kentucky Regulations

Kentucky's permanent regulatory program establishes requirements for the removal and redistribution of topsoil, sediment control, the diversion of streams and surface runoff, channel lining, and spoil disposal (405 KAR 16:050E; 060E; 070E; 080E; 130E). Appropriate sediment control measures must be designed, constructed, and maintained using the best technology currently available to: (1) prevent additional contributions of sediment to streamflow or to runoff outside the permit area; and (2) minimize erosion to the extent possible. Sediment control measures include practices carried out within and adjacent to the disturbed area. In addition, Kentucky requires that coal mining operators must establish on all land that has been disturbed a diverse, effective, and permanent vegetative cover of species native to the area which should minimize erosion.

4.3.4 Level of Protection for Biological Resources

Existing regulations protecting biological resources relate primarily to direct, on-site impacts. Sensitive aquatic habitats located within the permit area are provided protection directly through the State or Federal mining permit program and indirectly through water quality protection requirements. Existing regulations do not provide protection to sensitive terrestrial ecosystems or wetlands unless they have been designated as unsuitable for mining by the Lands Unsuitable for Mining Program. Therefore, USEPA should provide consideration of sensitive terrestrial ecosystems and wetlands through NEPA.

4.4 LAND RESOURCES

The continued extraction of coal from the Western Kentucky Coal Field will create adverse impacts on the land resources of the Coal Field. Two major impacts will occur as a result of coal extraction and associated activities: (1) the conversion of Environmentally Significant Agricultural (ESA) lands to non-farming use; and (2) the conversion of recreational land resources to other uses and the degradation of the environment adjacent to recreational facilities.

4.4.1 Environmentally Significant Agricultural Lands

The cumulative effect of continued coal production and increasing population levels in the Western Kentucky Coal Field will result in the conversion of ESA land to urban, mining-related, or other uses. The conversion of ESA land in the Western Kentucky Coal Field is considered a significant adverse impact because of the high economic value of this land resource in the Coal Field. Agricultural land not only produces food and fiber, it reduces runoff by absorbing precipitation, aids in replenishing groundwater supplies, buffers environmentally sensitive areas from encroaching development, and can serve in the land treatment of wastewater discharges.

OSM Regulations

Sections 507(b)(16) and 515(b)(7) of SMCRA authorize special performance standards regarding mining on prime farmlands. Under the OSM definition, prime farmland is land with suitable resource characteristics (as determined by the Soil Conservation Service) that also has been used as cropland for at least five of the ten years before acquisition for mining purposes. The SMCRA performance standards are designed to ensure that soil removal, soil stockpiling and replacement, and revegetation and reclamation methods will return a level of agricultural capacity of mined land equal to that which it had before disturbance (30 CFR 823).

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USEPA Regulations

It is USEPA policy to consider the protection of Environmentally Significant Agricultural lands from irreversible conversion to uses which result in its loss as an environmental or essential food production resource (USEPA's Policy to Protect Environmentally Significant Agricultural Lands, memorandum from Douglas Costle, Administrator, to Assistant Administrator, Regional Administrators, and Office Directors, 8 September 1978). Significant agricultural lands include the prime, unique, and additional farmlands with national, statewide, or local significance as defined by the US Department of Agriculture, Soil Conservation Service. USEPA has a special interest in protecting farmlands that: (1) are within or contiguous to environmentally sensitive areas and that protect or buffer such areas; (2) are suitable for the land treatment of organic wastes; or (3) have been improved with significant capital investments for the purpose of soil erosion control. Before undertaking an action, USEPA must determine whether there are ESA lands in the proposed permit area. If such lands are identified, direct and indirect effects of the undertaking on the land must be evaluated and adverse impacts avoided to the extent possible.

Kentucky Regulations

As with the Federal SMCRA requirements, the Kentucky program mandates that an applicant submit to KNREPC a plan for restoration of any prime farmland within permit boundaries (405 KAR 8:050E). The Kentucky program establishes special requirements for the removal, stockpiling, replacement, and revegetation of prime farmland (405 KAR 20:040E). The prime farmland must be restored to equivalent or higher levels of yield than unmined prime farmland in the surrounding area. All soil horizons to be used in the reconstruction of the soil must be removed before drilling, blasting, or mining of such lands.

4.4.2 Recreational Resources

Recreational land resources are not only threatened by the conversion to mining or other uses, but also may be affected by mining activities which generate noise and dust and degrade water and the visual environment. The recreational land resources of the Western Kentucky Coal Field are important regional resources. The direct and indirect effects of mining activities should be considered in order to enhance future recreational opportunities for the region's population.

OSM Regulations

Interim SMCRA regulations do not address protection of public parks. The permanent regulatory program does prohibit new surface mine operations within 300 feet of any public park or on any lands which will adversely affect any publicly owned park. In addition, the permanent program prohibits new coal mining operations on any lands within National Parks, National Wildlife Refuges, the National System of Trails, Wilderness Areas, Wild and Scenic Rivers, and National Recreation Areas. National Forests also may be excluded from mining activities, although exceptions to such exclusions are allowed upon the affirmative finding by the Secretary of Interior that multiple uses of the National Forest would not be impaired by the proposed mining. The public notice provisions of SMCRA provide opportunity for owners of private recreational facilities to comment on coal mine permit applications that may affect the operation of such facilities.

USEPA Regulations

Protection is provided to various types of recreational land through the provisions of the Wilderness Act of 1964 (16 USC 131-1136), Wild and Scenic Rivers Act of 1976 (PL 90-542, as amended through PL 94-486), and the Endangered Species Act of 1973 (16 USC 1531 et seq.).

Kentucky Regulations

Part of Kentucky's program for designating lands unsuitable for mining (405 KAR 24:040E) authorizes KNREPC to deny a permit if lands on which the proposed operation would be conducted include:

- lands within the boundaries of the National Park System; the National Wildlife Refuge System; the National System of Trails; the National Wilderness Preservation System; the Wild and Scenic Rivers System, including study rivers; and the National Recreation Areas; or
- lands within 300 feet of any park, public building, school, church, or community building.

Recreational lands are also protected under Kentucky Revised Statute (KRS) Chapter 146 which established a Statewide system of Nature Preserves and Wild Rivers. An inventory of these and other areas of recreational value including camping grounds, scenic overlooks, and recreational streams is maintained by the Kentucky Nature Preserves Commission (KNPC).

4.4.3 Level of Protection of Land Resources

Under both interim and permanent SMCRA regulations and the Kentucky program, stipulations are established for those lands classified as prime farmland and used previously as cropland. Prime farmlands not farmed for five of the last ten years, lands classified as unique farmland, farmland of statewide importance, farmland of local importance, farmland in or contiguous to Environmentally Sensitive Areas, farmland of waste utilization importance, or farmland with significant capital investments in Best Management Practices are not considered for protection by SMCRA or the State.

Under the Federal and State permanent regulatory programs surface mining operations are prohibited within 300 feet of any public park and restricted on any lands which may adversely affect public parks. This park restriction includes any area designated by a Federal, State, or local agency for public recreational use. Surface mining activities on lands beyond 300 feet and affecting public parks may be subject to joint review by the mining regulatory agency and the agency with jurisdiction over the park. Such restrictions are not applicable, however, to the interim program.

4.5 HUMAN RESOURCES

Coal mining and associated activities in the Western Kentucky Coal Field will have both beneficial and adverse impacts on human resources and transportation. These impacts occur in the form of economic effects, rapid population growth, increased demand in public and private services, and transportation impacts.

The economic effects of coal resource development in western Kentucky are expected to be beneficial to the economic well-being of the region. However, as coal mining becomes more extensive and provides more employment opportunities, the economic base of the area will become more dependent upon this single industry. Fluctuations in the coal industry will result in major fluctuations in the area's economy.

The most significant adverse effects of coal resource development on human resources are caused by rapid population growth. Rapid population growth occurs in response to the sudden creation of jobs in an area that does not have a local labor force of sufficient size and/or skill to fill the available positions. When this happens, non-local workers and their families are attracted to the area because of the employment opportunities made available to them. These new residents require adequate levels of basic community services and facilities.

As population grows, the demand increases for basic community services and facilities (infrastructure) such as housing, wastewater treatment, water, health care, education, transportation network, fire and police protection, and recreational facilities. In most instances, the existing tax base of the community cannot supply these services and facilities to the new residents on such a short notice. Because of the lag in the receipt of tax revenues from the new residents and the long lead times and high costs of required public improvement projects, serious strains on existing infrastructure elements may occur. The provision of housing for the new residents of an area may lag several years behind the need because of the lack of adequate public infrastructure (roads, sewers, water, etc.), the unavailability of construction and/or mortgage credit, or the inability to assemble land needed for new housing developments.

Local transportation networks, primarily the road system, can also be adversely affected by mining activities and mining-induced population growth.

Public safety and congestion problems on local roads can occur as a result of the larger volumes of private vehicles (primarily coal haul trucks) using public roadways, and increases in coal-related rail traffic which cause a higher probability of rail-highway accidents and delays. The larger volume of coal haul trucks using public roadways may also degrade the quality of road surfaces.

OSM Regulations

SMCRA regulations incorporate very little consideration of impacts to human resources. There are no provisions mandating the mitigation of possible adverse effects to the economy of the area, any induced population growth, or public and private sector infrastructure. Under the SMCRA program, all applicants must submit with the mining application a transportation plan approved by the State Department of Transportation. The State DOT classifies proposed routes regarding weight limits and provides information regarding the existence of any substandard bridges intended for use. The permanent SMCRA program prohibits new mining operations within 100 feet of a public road right-of-way except where a mine haul road enters or adjoins the right-of-way. The permanent program also prohibits mining operations within 300 feet of an occupied dwelling without the owner's consent; within 300 feet of any public, institutional, or community building, church, or school; or within 100 feet of a cemetery (30 CFR 761.11). The general performance standards also set forth requirements for mining roads and require that post-mining land use be compatible with land use policies and plans.

Kentucky Regulations

The permanent Kentucky program, like the OSM program, regulates operations within 100 feet of a public right-of-way; within 300 feet of an occupied dwelling without the owner's consent; within 300 feet of any public, institutional, or community building; or within 100 feet of a cemetery (405 KAR 24:040E). In addition, an access permit must be obtained for haul roads or entrances to proposed mining facilities which intersect State routes. The State Department of Transportation reviews proposed plans and the plans must be approved prior to issuance of the access permit. Kentucky's Local Government Economic Assistance Act also provides a means for allocating revenues from coal severance taxes among the local governments. The Act establishes priority areas for the expenditure of these funds. Impacts on local communities in coal producing areas are mitigated by this economic assistance.

4.5.1 Level of Protection for Human Resources

The impacts of coal mining activities on human resources are sufficiently mitigated by existing State and Federal laws and regulations. Impacts to the transportation networks are controlled by the mining regulations while socioeconomic impacts are mitigated by the distribution of the coal severance tax revenues under the Local Government Economic Assistance Act.

4.6 CULTURAL RESOURCES

Coal mining activities in the Western Kentucky Coal Field can result in adverse impacts on the cultural resources of the area. These resources may include archaeological or historic sites, properties, structures, or objects that are listed on or determined eligible for the National Register of Historic Places. Cultural resources are highly susceptible to damage by coal mining particularly by surface mining activities. Adverse impacts to cultural resources include destruction of a site, isolation of a site from the surrounding environment, alteration of a site, and neglect of a site resulting in deterioration or destruction.

OSM Regulations

The permanent program of SMCRA stipulates that no new coal mines will be permitted that may affect publicly owned places that are listed on the National Register of Historic Places unless such mining is approved by the State Historic Preservation Office (SHPO). The regulatory authority's discretionary power to prohibit mining on certain lands incorporated in the permanent program includes those areas where mining may affect historic lands of cultural, historic, scientific, or aesthetic value. Sites eligible for the National Register are not presently protected under SMCRA.

USEPA Regulations

USEPA is subject to the requirements of the National Historic Preservation Act of 1966 as amended (16 USC 470 et seq.), the Archaeological Historic Preservation Act of 1974 (16 USC 469 et seq.), and Executive Order 11593 entitled "Protection and Enhancement of the Cultural Environment." These provisions and regulations establish review procedures which USEPA must follow when significant cultural resources are or may be involved. If a USEPA undertaking affects any property with historic, architectural, archaeological, or cultural value that is listed on or eligible for listing on the National Register of Historic Places, the responsible official must comply with the procedures for consultation and comment promulgated by the Advisory Council on Historic Preservation in 36 CFR Part 800. Such undertakings include any new and continuing projects and program activities carried out pursuant to a Federal permit (36 CFR 800.2). The responsible official must identify properties affected by the undertaking that are potentially eligible for listing on the National Register and request a determination of eligibility from the Keeper of the National Register, Department of the Interior. If a USEPA activity may cause irreparable loss or destruction of significant scientific, prehistoric, historic, or archaeological data, the responsible official or the Secretary of the Interior is authorized to undertake data recovery and preservation activities.

USEPA will issue a New Source NPDES permit for mining operations that will affect a National Register site only after appropriate interagency coordination has been pursued. The applicant may be asked to furnish site-specific information to enable USEPA in cooperation with the State Historic Preservation Office (SHPO) to determine whether any resources potentially eligible for the National Register are to be affected by proposed mining activities.

Kentucky Regulations

Under the Kentucky program, mining operations will be prohibited on lands which will adversely affect any publicly owned places included on the National Register of Historic Places unless jointly allowed by all affected agencies

(805 KAR 24:040E). In addition, the Kentucky Heritage Commission is charged with protecting and developing the historic resources of the State. The Commission encourages, promotes, and advises State, local, and Federal government agencies concerning means of achieving these two goals. The procedures of the Commission require that relevant agencies consult with the State Historic Preservation Office to identify historical, structural, and archaeological sites in the project area and consider these resources in project planning.

4.6.1 Level of Protection for Cultural Resources

Existing regulations require the identification of known historical, cultural, or archaeological resources and prohibit surface mining activities which adversely affect places on the National Register. These regulations are established only in the permanent State and Federal mining programs, however, and apply solely to resources already identified and listed on the National Register [30 CFR 761.11(c)]. The regulations do not require the consideration of resources which may be eligible for listing. If the resource has not already been identified or is privately owned, it probably will not be addressed under SMCRA regulation.

4.7 ATMOSPHERIC RESOURCES

4.7.1 Air Quality

Coal mining and associated activities in the Western Kentucky Coal Field may result in significant amounts of fugitive dust emissions. Other pollutants may be emitted into the air as a result of these operations, but normally in insignificant amounts. Fugutive dust emissions are generated primarily by trucks on haul roads. Other sources include surface mining, blasting, preparation, coal loading and unloading, and wind erosion. The transportation of coal by truck on unpaved public and private haul roads is the major contributor of fugitive dust emissions from coal-related activities in western Kentucky.

OSM Regulations

Permanent SMCRA regulations provide for the protection of air resources through the control and reduction of fugitive dust emissions from on-site haul roads and areas disturbed during mining (30 CFR 816.95). The specific fugitive dust control measures are to be determined by the regulatory agency administering the program. The methods generally include watering, chemical treatment or paving of roads, revegetation, covering of haul trucks, and the use of conveyor systems. The methods which must be used for controlling fugitive dust emissions are to be approved on a site-specific basis for each mine. Site-specific measures will be determined on the basis of applicable Federal and State air quality standards, climate, existing air quality, and size and type of proposed operations. The regulations do not consider pollutants other than fugitive dust, but SMCRA does require compliance with all other applicable Federal and State air quality laws.

USEPA Regulations

Because the granting of a New Source NDPES permit by USEPA is considered a major Federal action subject to NEPA compliance, air quality impacts must be addressed. USEPA addresses the impact on air quality pursuant to the provisions of the Clean Air Act (CAA; USC 7401-7642 as amended by 88 Stat. 246, 91 Stat. 1401-02). This permit program is administered by the KNREPC under a program approved by USEPA.

Ambient air quality standards (40 CFR 50) specify the ambient air quality that must be maintained outside the project boundary or within the boundary where the general public has access. Standards designated as primary are those necessary, with an adequate margin of safety, to protect the public health; secondary standards are those necessary to protect the public welfare from any known or anticipated adverse effects of an air pollutant.

In 1974, USEPA issued regulations for the prevention of significant deterioration of air quality (PSD) under the 1970 version of the Clean Air Act (PL 90-604). These regulations established a plan for protecting areas that possess air quality which currently is cleaner than the National Ambient Air

Quality Standards (NAAQS). Under USEPA's regulatory plan, clean air areas of the nation could be designated as one of three classes. The plan allows specified numerical increments of air pollution increases from major stationary sources for each class up to a level considered to be significant for that area. Class I areas need extraordinary protection from air quality deterioration and only minor increases in air pollution levels are allowable. Under this concept, virtually any increase in air pollution in Class I (pristine) areas would be considered significant. Class II increments allow for increases in air pollution levels that usually accompany well-controlled growth. Class III increments allow increases in air pollution levels up to the NAAQS.

Kentucky Regulations

Kentucky air pollution control regulations establish standards and control measures for atmospheric emissions (401 KAR 50-65). Fugitive emissions are addressed in 401 KAR 63:010 requiring that reasonable precautions should be taken to prevent particulate matter from becoming airborne. Methods suggested to prevent such emissions include the application of certain substances (e.g., water, oil, chemicals) on surfaces creating dusts; the installation of dust-reduction equipment; the use of covers for transportation vehicles; and the maintenance of paved roadways.

The permanent State program establishes requirements for the control and monitoring of air pollution from surface mining activities with specific measures for the control of fugitive dust (405 KAR 16:170E). Each permittee must plan and employ fugitive dust control measures as an integral part of site preparation, coal mining, and reclamation operations. In addition, air monitoring equipment must be installed and monitoring conducted according to an approved monitoring plan.

4.7.2 Noise

The noise impacts from coal mining operations and coal haul trucks can be significant at nearby sensitive receptors. Sensitive receptors located adjacent to mines, processing plants, and coal haul routes may be adversely affected by the noise generated by these facilities. As the number of mines increases in western Kentucky, the number of affected sensitive receptors will increase.

OSM Regulations

The regulations of OSM under SMCRA require that noise and vibration from blasting operations be controlled to minimize the danger of adverse effects from airblast and vibration to humans and structures. The Act authorizes pre-blast surveys, blasting schedules, limits on airblasts, and explosives rules. No other specific noise regulations exist.

Kentucky Regulations

The Kentucky program establishes specific requirements for the use of explosives including restrictions on the timing and location of blasting (405 KAR 16:120E). Blasting may be conducted only between sunrise and sunset, unless otherwise approved, and may occur only for a limited amount of time. No other requirements exist for the regulation of noise impacts, however.

4.7.3 Protection of Air Quality and the Acoustic Environment

The Kentucky regulations provide the primary source of control over emissions caused by surface mining activities. Until the permanent program is adopted, however, State mining regulations do not establish specific provisions controlling air emissions. The basic protection is provided by existing State air quality regulations. While the State air quality law provides authority to review off-site as well as on-site impacts, the State air quality protection agency presently limits its review of mining operations primarily to cleaning and processing operations.

The permanent SMCRA regulations for fugitive dust emissions are restricted solely to on-site activities. Fugitive dust regulations primarily restrict the emissions from on-site haul roads. SMCRA stipulations do not regulate fugitive dust emissions on off-site public roads which are used as haul roads. Consequently, violations of primary ambient air quality standards can occur at sensitive receptors.

The regulation of noise from mining operations is limited to blasting activities. Neither State nor SMCRA regulations require protection of the acoustic environment from other mining operations including noise emissions associated with coal haul trucks on public and private roads.

4.8 SUMMARY

Many of the impacts of coal mining activities in western Kentucky are controlled or otherwise mitigated by Federal or State regulations. Some impacts, however, still remain unmitigated. Table 4.8-1 presents a summary of the unmitigated impacts of coal mining activities by resource category.

Table 4.8-1. Summary of coal mining impacts by resource for the Western Kentucky Coal Field that are not regulated by State or Federal laws.

WATER RESOURCES	
Surface Water	Surface disturbances can adversely affect the water quality of sensitive stream segments possibly causing a reduction, alteration in composition, loss of diversity, elimination of certain forms of aquatic life or reduction in water use opportunities for domestic consumption or industrial processes.
Groundwater	Migration of acid mine drainage into groundwater, particularly in groundwater recharge areas, can adversely affect public and private water supply wells.
BIOLOGICAL RESOURCES	
Terrestrial Ecosystems (Including threatened or endangered species)	Mining can cause elimination or disturbance of identified sensitive plant and animal habitats, and identified sensitive areas.
Aquatic Ecosystems (Including threatened or endangered species)	Mining can cause the elimination or disturbance of identified sensitive aquatic habitats and identified sensitive areas by changing the water quality characteristics of streams.
Wetlands	Surface mining can result in the direct removal or elimination of wetlands during land clearing operations. The introduction of acid mine drainage and sedimentation into wetland areas, changes in groundwater flow, and alteration of soil moisture levels may result in the degradation of wetlands.
LAND RESOURCES	
Environmentally Significant Agricultural (ESA) Lands	Mining can result in the conversion of prime farmland cultivated less than five of the past ten years, unique farmland, and farmland of statewide or local importance to non-agricultural uses, reducing an already scarce resource in western Kentucky.
Recreation Lands	Mining can result in adverse impacts on recreational lands adjacent to mining operations by noise, degraded water, dust, and/or visual effects.

Table 4.8-1. Summary of coal mining impacts by resource for the Western Kentucky Coal Field that are not regulated by State or Federal laws (concluded).

CULTURAL RESOURCES	
Historic/Archaeological Sites	Under the interim Federal program, mining operations can alter, destroy, or otherwise affect sites that are listed on or are eligible for inclusion on the National Register. When the permanent Kentucky regulations become effective, those sites that are eligible for inclusion but not listed will remain unprotected. Limited survey work in western Kentucky increases the potential for impacting such eligible sites.
AIR QUALITY AND NOISE	
Air Quality	Coal transportation by haul trucks on unpaved public and private roads not within the permit area can result in fugitive dust emissions at sensitive receptors, affecting public health and general welfare.
Noise	Mining operations and coal transportation on public and private haul roads can increase ambient noise levels significantly at sensitive receptors located near the operations or along roads with high volumes of coal truck traffic, affecting public health and general welfare.

5.0 ALTERNATIVE NEPA COMPLIANCE STRATEGIES

During the process of developing a suitable strategy for compliance with NEPA in the review of New Source coal mining NPDES applications for western Kentucky, a total of 29 possible compliance alternatives were developed and evaluated by USEPA. In order to be considered feasible, a compliance alternative had to be thorough in its treatment of environmental effects such that USEPA compliance with the provisions of NEPA was assured. The compliance alternative also had to result in a streamlining of the review process such that the NPDES permit action would not result in substantial delays in the opening of New Source coal mines. Finally, the compliance alternatives which were carried through their initial screening had to be technically feasible such that they were implementable with a reasonable degree of ease. Four general compliance alternatives evolved from the initial screening process.

This chapter describes the current NEPA compliance procedures utilized by USEPA, the concept of Resource Threshold Criteria, the four general compliance alternatives that resulted from initial screening processes the No Action Alternative, and the Recommended Action.

5.1 CURRENT COMPLIANCE PROCEDURES

Current USEPA NEPA compliance procedures work well for large singular projects, but are resource and time consuming for the substantial number of coal mining applications to be processed. When Region IV's Water Management Division determines an applicant to be a New Source, USEPA usually conducts a New Source meeting to inform the applicant of NEPA requirements and to request certain environmental information. Based on the information submitted, USEPA makes a preliminary decision to: (1) issue a finding of no significant impact (FONSI); (2) request additional information; (3) request the applicant to prepare an environmental information document (EID); or (4) require a Federally prepared environmental impact statement (EIS). Normally up to 30 days are required by USEPA to make this decision after the initial information is submitted. Once the decision is made, the following time frames could generally be expected:

- FONSI - 30 to 45 days for USEPA issuance;
- additional information - 45 days for applicant response plus 30 days for USEPA decision;
- EID - 90 days for applicant response plus 45 days for USEPA decision; and
- EIS - 365 days to complete plus 45 days for USEPA decision.

The NEPA compliance procedure ultimately results in either the issuance, issuance with conditions, or denial of the New Source NPDES permit.

Several new components based on the information and analyses performed in this EIA were developed which can be used in an environmental review. These components were not a part of the previous compliance program.

The first component involves the use of the USEPA Resource Atlas developed as part of this study effort and the Geographic Information System (GIS) developed by the Kentucky Department for Natural Resources and Environmental Protection for environmental review decisions. The GIS was prepared subsequent to USEPA's Atlas and used much of its data. Most importantly, the GIS is a computerized system which may be frequently updated. These readily available data should greatly assist applicants in providing information and should expedite the environmental review process under any of the strategies.

A second component anticipates the use of standardized documents and/or language in FONSI's and Environmental Impact Assessments based on the areawide environmental review and experience gathered in the NEPA compliance program for coal mining activities. This Areawide EIA has generated substantial analyses of impacts of and alternatives for mitigating the effects of mining operations. These discussions will be of significant value in preparing future review documentation.

A third component involves focusing on a smaller number of environmental issues. This Areawide EIA has identified the resource areas where the potential for significant impact exists and has examined the regulatory responsibility of other Federal and State agencies to determine the level of environmental protection already provided. USEPA is therefore able to concentrate its efforts on those resource impact areas that are not regulated by other agencies. This focusing will help avoid needless investigations.

A fourth component involves the SMCRA program, as well as the acceptance by OSM of Kentucky's primacy for program implementation. USEPA has prepared its initial request for environmental data based on the assumption that the Commonwealth permanent program will be in effect basically as now constituted. Under this assumption, duplication between the programs in terms of data requests will be avoided.

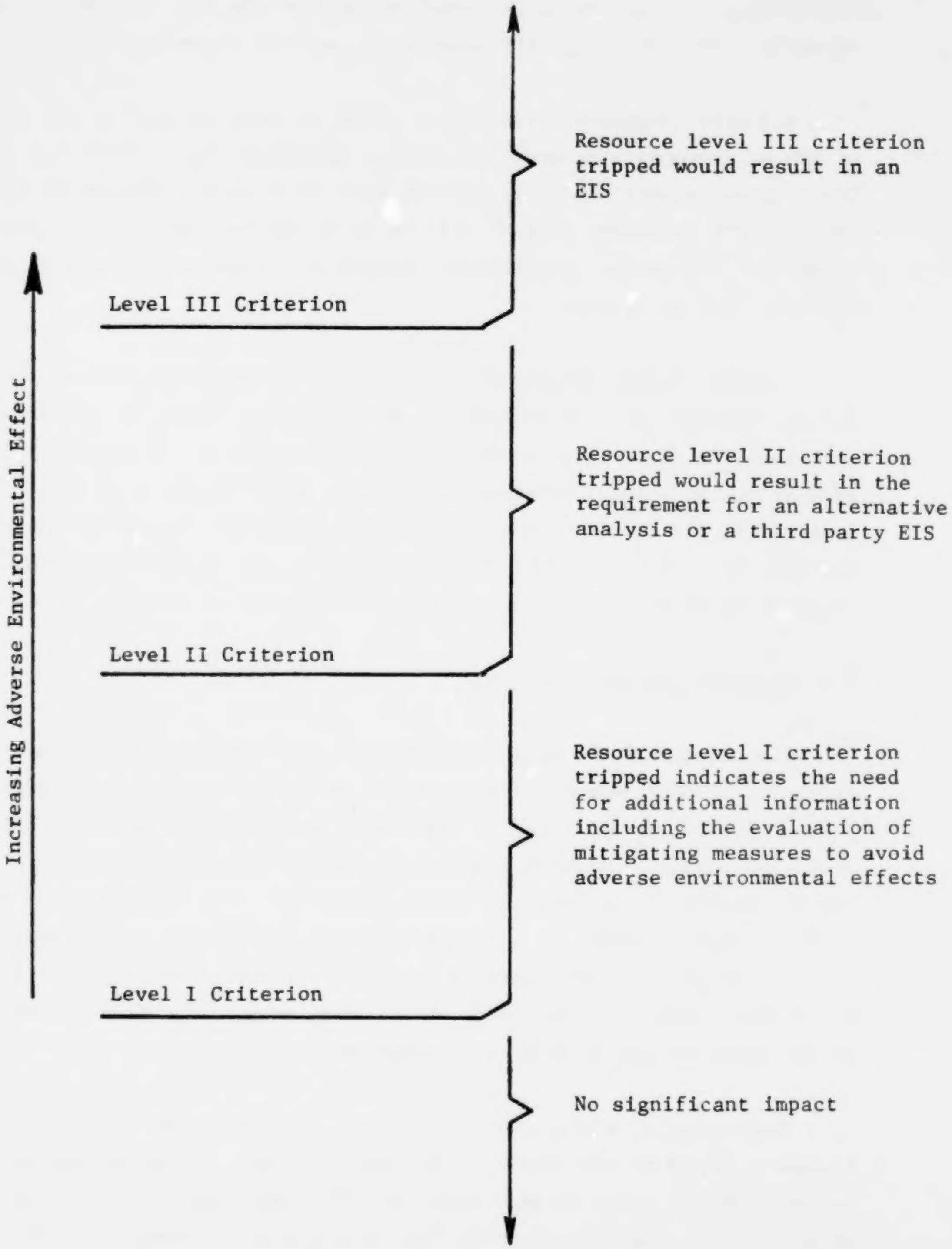
A final element developed in this areawide analysis involves the use of Resource Threshold Criteria (RTC). The RTC define levels of potential impacts that could initiate various USEPA environmental review actions (e.g., FONSI, request for additional information, further alternatives analysis). The RTC form the foundation of streamlining procedures under several of the strategies, but are not an integral part of all approaches for reasons described under those strategies. Section 5.2 discusses this concept further.

5.2 RESOURCE THRESHOLD CRITERIA

The concept of Resource Threshold Criteria (RTC) forms the basis for streamlining environmental review decisions under several of the NEPA compliance strategies evaluated in this EIA. Using the RTC concept, information needs and permit processing times would depend upon the significance of environmental impacts of the proposed mining operation. The evaluation of the degree of environmental effect of a proposed mining operation would be measured against the criteria set forth in the RTC. As indicated in Figure 5.2-1, three basic levels or thresholds define four categories of environmental effect which result in differing responses by USEPA.

Environmental effects in any resource area which are less than a Level I threshold would be considered to be insignificant. A recommendation for permit approval would be made based on NEPA compliance as established in this Areawide EIA. The determination that no significant impacts are anticipated based on the areawide review would be contained in the public notice of the proposed NPDES permit issuance.

Figure 5.2-1. The use of Resource Threshold Criteria to determine USEPA permit review actions.


Increasing Adverse Environmental Effect
Level III Criterion
Resource level III criterion tripped would result in an EIS
Level II Criterion
Resource level II criterion tripped would result in the requirement for an alternative analysis or a third party EIS
Level I Criterion
Resource level I criterion tripped indicates the need for additional information including the evaluation of mitigating measures to avoid adverse environmental effects
No significant impact

Environmental effects which are equal to or greater than Level I would trigger the need for additional resource-specific information. This detailed information should be sufficient to enable the decision to be made as to whether the environmental impact is really insignificant (i.e., the Areawide EIA can be relied upon for compliance with NEPA) or is significant (i.e., above Level II and requires a detailed consideration of alternatives and impacts). If additional information indicates that Level II is not triggered, a FONSI would be prepared and distributed.

Environmental effects found to be significant would trip the Level II threshold. The need for preparation of an alternatives analysis or a third party EIS by the applicant would be indicated. Essentially, this means that a detailed analysis of alternatives would be required. A permit approval recommendation could be made if the applicant redefined the permit area or utilized alternative methods of operation to reduce specific environmental effects to insignificant levels. Conditions outlining an applicant's proposed changes to his operation would be part of the permit. Further, a FONSI would be prepared citing the measures to be used to assure that no significant impacts would occur.

Any proposed activity which equals or exceeds the Level III threshold would be considered for permit action only after the completion of an EIS. This EIS could be prepared by either the conventional or third party process. USEPA would encourage the use of the third party process to avoid sequential decisionmaking and to expedite the environmental review process.

In response to these threshold levels, USEPA has developed draft Resource Threshold Criteria for the following resources:

- surface water and sensitive aquatic resources
- groundwater
- sensitive terrestrial ecosystems
- wetlands
- noise
- air quality
- environmentally significant agricultural land
- recreational land
- historic and archaeological sites
- public and Federal, State, and local government comments

Appendix A contains the Resource Threshold Criteria for each of the resource areas listed above. These draft RTC incorporate specific comments made following a USEPA internal review and review by State and Federal agencies. This review considered the detailed comments of the Kentucky Coal Association (KCA) as well as other industry spokesmen for each resource area. Where requested changes were determined to be appropriate, the draft RTC were modified.

Chapter 4.0 discussed the resource protection afforded through existing Federal and State regulations. The development of the RTC's and the areas of potential impact assumed the implementation of Kentucky's permanent regulatory program for surface coal mining and reclamation operations. If these regulations are significantly modified, USEPA's reliance on them to mitigate significant impacts would have to be reexamined.

Each resource area is impacted to a different degree by coal mining activities. These impacts may be mitigated at varying levels for each resource. The associated costs to USEPA and the applicants vary considerably. Therefore, a single NEPA compliance strategy is not necessarily appropriate to mitigate all coal mining impacts. In addition to the alternatives available for each resource area, USEPA has the option of excluding certain resources altogether from the review process. This would demand fewer human and financial resources on the part of USEPA.

The permutations and combinations for use of these Resource Threshold Criteria are many. The incremental environmental benefit must be weighed against the demand for USEPA resources. The individual analyses of Resource Threshold Criteria include: (1) an estimation of the annual number of permit applications triggering the threshold levels; (2) the total annual cost to the applicant of supplying data, alternatives analyses, and EIS's to USEPA; and (3) the annual USEPA manpower and costs. The applicant and USEPA costs are based on the estimations of applications triggering certain threshold levels. Total applicant and USEPA costs are outlined for strategies using all Resource Threshold Criteria.

A number of advantages result from the use of the Resource Threshold Criteria:

- There is a reduction in the number and complexity of the individual decisions which must be made in evaluating applications. The focus is on critical issues. This approach would lead to substantial savings in time and ensure consistency among reviews.
- Coordination with Commonwealth and Federal agencies in the development of the Resource Threshold Criteria clarifies concerns and procedures at the outset. Agencies involved in the development of the Criteria would not need to be notified of any applications falling below the initial level.
- The coal mining industry is provided with a clearly established procedure which USEPA will use in evaluating environmental impacts of proposed operations.
- The right of the public, the permit applicant and interested government agencies to comment on the appropriateness and sufficiency of the environmental review for each individual permit is maintained.

5.2.1 Effect of Public Comment

The Public Comment Criteria referenced previously (which includes Federal, State, and local agency comments as well as individuals) play a key role in providing flexibility to the system. The resource threshold levels attempt to clarify the difference between insignificant and significant adverse impacts on environmental resources. However, because of the great variety of environmental resources potentially impacted as well as changes in the coal mining industry, the identified resources and levels may not always identify significant impacts. Therefore, public, local, State, and Federal agency comment can provide valuable input into the environmental review process by providing for a more comprehensive identification of any significant adverse impacts.

Some comments will be received by USEPA at the time the permit application is being reviewed. Most, however, will probably not be received until public notice of the proposed issuance of an NPDES permit has been given. At this point USEPA has already made a preliminary decision that the mining operation poses no unacceptable threat to the environment. This decision may have been based on alternatives and mitigating measures in the form of permit conditions.

All comments received on a proposed NPDES permit could be reviewed by USEPA. Substantive issues dealing with any of the resource areas could be considered, reviewed, and decisions made on the basis of the following levels:

Level I	Significant issues raised by public, local, State, or Federal parties on a resource area not otherwise identified or adequately addressed.
Level II	Significant adverse impacts are likely to result on a resource area identified under Level I.
Level III	Unmitigated significant adverse impacts will result on a resource area identified under Level I.

5.3 ALTERNATIVES

Four alternative NEPA compliance strategies, some with variations, were chosen for detailed consideration. The general strategies are described as Individual, Areawide, Areawide-Individual, and Areawide-Subareawide-Individual alternatives. The No Action Alternative was also evaluated. Each potential alternative is evaluated for NEPA compliance on the basis of:

- environmental benefits
- manpower and cost
- processing time
- compliance with statutes and/or regulations
- elimination of duplication of effort
- flexibility

A description of each general alternative follows.

5.3.1 No Action Alternative

This alternative assumes that USEPA Region IV would avoid making New Source determinations for the coal industry and would entail the use of NEPA compliance activities only when requested by the applicant or an outside party, whether Federal, State, or local. This alternative results in lowest level environmental enhancement occurring for the majority of coal operations with some substantial environmental protection benefits occurring on those operations brought to the attention of USEPA.

The No Action Alternative involves minimal resources (less than one man-year of effort), and allows some flexibility regarding which projects are addressed. However, this alternative would likely be a legally indefensible policy if challenged and could result in significant delays in permit issuance, thus precluding any real flexibility.

5.3.2 Individual Review Alternative

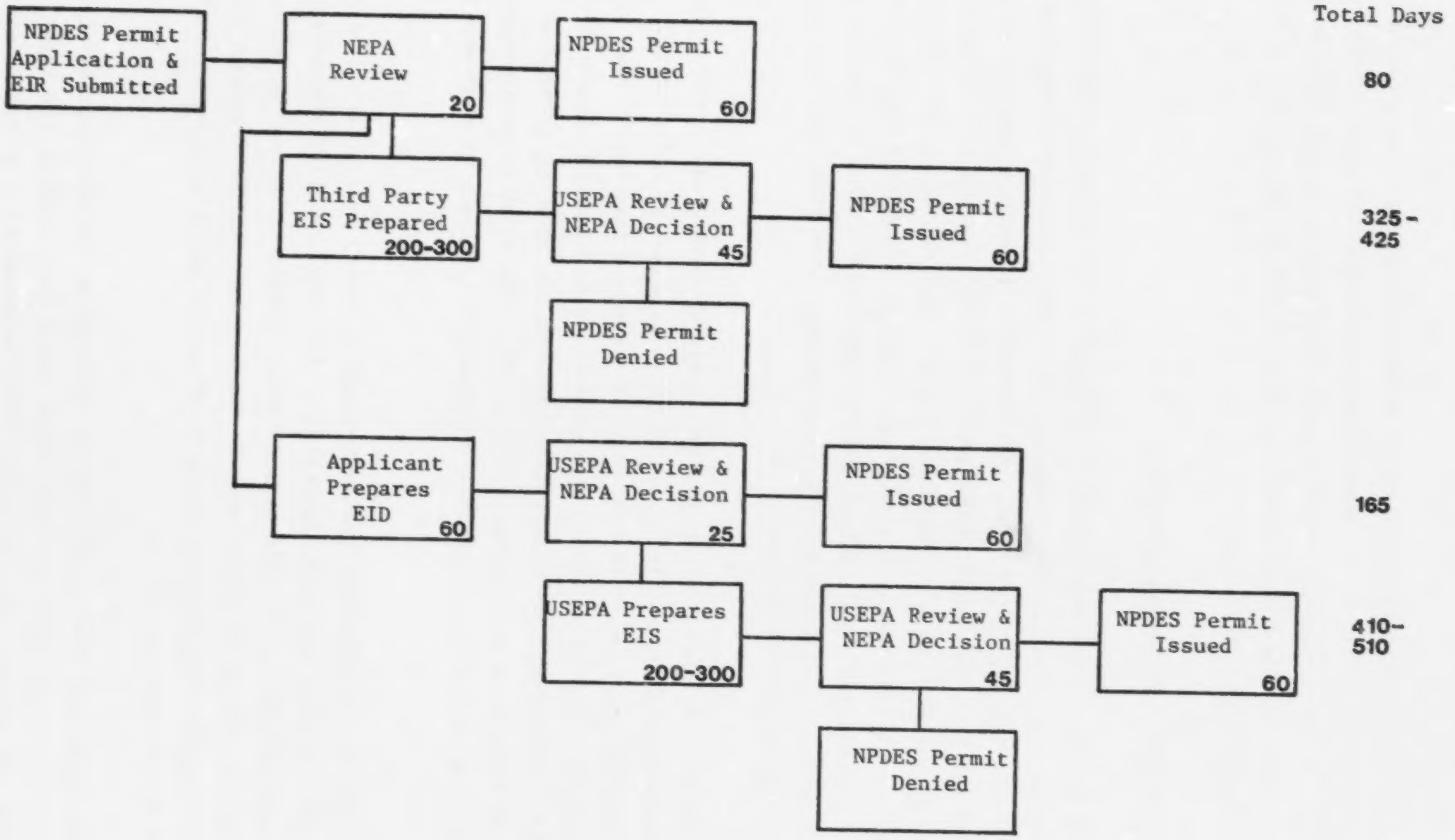
Procedurally, this alternative is similar to the existing compliance process. It basically involves changing the number of reviews from approximately 20 per year to 70 per year. Individual environmental reviews would be conducted for each New Source NPDES coal mining application with FONSI's or EIS's being prepared on a case-by-case basis. The four components discussed previously (available data, standardized language, issue focusing with the RTC, and State/USEPA coordination) and the additional number of reviews performed constitute the primary differences between this individual approach and the existing compliance program.

Figure 5.3-1 indicates the various levels of review and corresponding time frames that are possible using the Individual Review Alternative. Although reviews would still be conducted on a case-by-case basis, some time savings would result with use of the available data base and standardized language. Processing time frames described for the existing procedures would likely be reduced by approximately 15% to 50%. The level of environmental protection would be high due to the site-specific analysis of each application.

Under this alternative, the environmental review process would be conducted individually for each application. Full public notice and appeal opportunities under NEPA would be available. Public or agency opposition to environmental review decisions made in conjunction with the issuance of a particular permit and the supporting FONSI or EIS would be considered through established procedures.

The Individual Review Alternative anticipates the availability of ample financial and human resources with which USEPA could conduct the large volume of individual reviews and comply with NEPA requirements. It was originally

Figure 5.3-1. Individual Review Alternative for NEPA review process for the issuance of New Source coal mining NPDES permits in western Kentucky.


NPDES Permit Application & EIR Submitted
NEPA Review
20
NPDES Permit Issued
60
Third Party EIS Prepared
200-300
USEPA Review & NEPA Decision
45
NPDES Permit Issued
60
NPDES Permit Denied
Applicant Prepares EID
60
USEPA Review & NEPA Decision
25
NPDES Permit Issued
60
USEPA Prepares EIS
200-300
USEPA Review & NEPA Decision
45
NPDES Permit Issued
60
NPDES Permit Denied
Total Days
80
325-425
165
410-510

Numbers represent estimated days required to complete each action.

estimated based on USEPA and consultant studies that 7 USEPA man-years would be required to perform NEPA compliance using this approach. Due to the detailed analysis conducted in developing the Resource Threshold Criteria and the data base developed for this EIA, it is now estimated that approximately 1.2 manyears would be required.

This alternative would fully comply with USEPA's statutory responsibilities. It would also allow for virtually complete flexibility in handling site-specific impact mitigation and NEPA processing. This alternative has the greatest possibility for duplication of effort between USEPA and other Federal and State agencies because the responsibilities of other agencies are not considered.

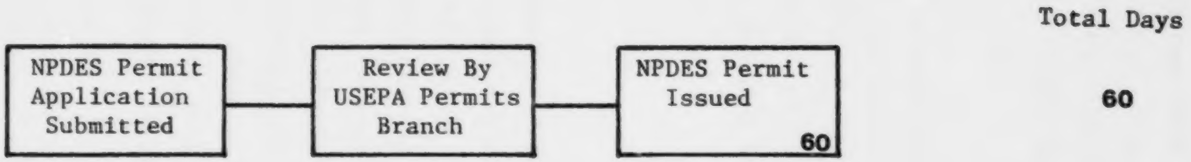
5.3.3 Areawide Review Alternative

The Areawide Review Alternative assumes that the Western Kentucky Coal Field Areawide EIA and the analysis therein would constitute the substantive analysis for all future actions regarding permitting of New Source coal-related operations. Figure 5.3-2 indicates the general permit process that is used with the Areawide Review Alternative. There are three options available to the Agency to implement this kind of a strategy. USEPA could: (1) contend that no future action by USEPA would result in significant impacts; (2) contend that although some actions may cause significant impacts, there are no means available to mitigate these impacts; or (3) develop general conditions to be placed on all permits to address the identified significant impact areas. A more detailed discussion of each follows.

5.3.3.1 Areawide Finding of No Significant Impact

This alternative would be intended to satisfy USEPA's substantive NEPA review responsibility for all New Source NPDES permitting in western Kentucky through a single document, this Areawide EIA. All substantive NEPA review requirements would be handled at the time of the issuance of the EIA. A NEPA review of individual applications would not be carried out with this alternative. Rather, the public notice on each permit would reference the Areawide EIA conclusion that no significant impacts would be anticipated through a brief standard FONSI statement.

Figure 5.3-2. Areawide Review Alternative for NEPA review process for the issuance of New Source coal mining NPDES permits in western Kentucky.


Total Days
NPDES Permit Application Submitted
Review By USEPA Permits Branch
NPDES Permit Issued
60
60

Numbers represent estimated days required to complete each action.

Processing time and manpower requirements for site-specific environmental reviews and decisions on FONSI's, EID's, and EIS's would be eliminated. Region IV would issue New Source mining permits based totally on the identification of no significant adverse impacts and the description of mitigative measures available through other Federal, State, and/or local programs identified in the Areawide EIA. All impacts of coal mining in the Western Kentucky Coal Field would either be characterized as not significantly affecting the quality of the environment or as subject to mitigation by another agency.

This option affords the least environmental protection and the least opportunity for minimizing significant adverse impacts. It would involve no attempt to mitigate adverse impacts either through assistance to applicants or through the imposition of permit conditions. This NEPA compliance strategy would not address any site-specific impacts from a particular coal mining or coal-related facility, and as such would make it difficult to justify as meeting NEPA requirements. The major areas that would not receive consideration by USEPA are: (1) environmentally sensitive terrestrial and aquatic resources; (2) noise; (3) fugitive dust generation on haul roads; (4) water supply intakes; (5) wetlands; (6) archaeological and historical resources; (7) recreational land; and (8) groundwater. These resources typically are not fully considered at the local, state or other Federal agency level. Significantly less mitigation of adverse impacts would result should USEPA select this alternative.

The Areawide FONSI Alternative is potentially the most direct and expedient method to administer the permitting program for the Western Kentucky Coal Field. It is the least costly to the mining applicants, since they would not be providing USEPA with detailed environmental data for analysis. However, it is arguable that with this broad brush review approach the goals of NEPA would not be furthered and the requirements of NEPA would not be met. In addition, the likelihood of a lawsuit challenging the strategy is greater under this option than under any other except the No Action Alternative. The delay such a legal challenge would have on specific permit issuances cannot be accurately estimated. A successful legal challenge of this approach could require further revisions of the Areawide EIA.

Procedurally, a short standard FONSI statement would be included in the notice of each permit. Concerns involving unique site-specific environmental impacts could not be met under this alternative, thus making legal challenges to permit issuance more likely.

This alternative does provide the greatest opportunity for elimination of duplication of effort. Little would be done by USEPA that could duplicate other agencies' efforts. This alternative, however, is the least flexible of all considered, and is unlikely to be legally defensible.

5.3.3.2 Impacts Not Mitigatable by USEPA

This option would change the EIA to an EIS which would contend that there are no means available to mitigate some types of impacts even though they may be significant. USEPA Region IV would issue New Source mining NPDES permits recognizing that some types of significant adverse impacts may occur for which there are no mitigative measures available for USEPA or other Federal, State, and/or local programs to implement. USEPA would argue, however, that although potentially significant these impacts are not so severe as to justify denial of an NPDES permit.

Processing time and manpower requirements for site-specific environmental reviews and decisions on FONSI's, EID's, and EIS's would be similar to the Areawide FONSI alternative discussed above. There would be a corresponding lack of environmental protection. This option is also a direct and expedient method to administer the permitting program for western Kentucky. It is one of the least costly in the short run to mining applicants. However it disregards present knowledge of mitigative measures. Consequently, it too entails a likelihood for lawsuits challenging the strategy, which could cause delays in permit issuance. There would be little duplication of effort since USEPA would be doing virtually nothing that could duplicate other agencies' efforts. This approach has no flexibility concerning impacts.

The argument for this option is that Federal agencies should only expend manpower and taxpayers' dollars to address issues for which mitigation is available and can be implemented by USEPA. This option is of doubtful value in light of existing regulations that require the Agency to address alternatives available to all parties, not only USEPA. The argument of marginal utility could be attempted--that is that the cost of compliance and enforcement outweighs the environmental benefit of the potential mitigative measures.

5.3.3.3 General Conditioning

This option would establish general conditions that would apply to each New Source coal facility permit applicant. These conditions would be developed and fully described in the Areawide EIA. A condition would be written for each resource area for which significant impacts might occur. As part of each condition, a description of when that condition would be applicable would be included. Procedurally, a very brief FONSI statement would be included in the notice of each permit.

The resource areas described in Section 5.2 would be the areas of major emphasis. General permit conditions could be imposed which would mitigate impacts on any or all of these resource areas. The permit conditions could recognize that any one of several options to mitigate adverse impacts would be satisfactory.

This alternative could be argued to result in potentially significant environmental benefits because every permit would require the imposition of these conditions. However, since the general conditions would necessarily be environmentally conservative, this alternative would at times result in costs imposed on the permittees which would not be imposed under site-specific review alternatives.

This alternative would not require additional manpower to perform individual reviews since each permit would have the same conditions. There would clearly be other resources required to be available under this option, however, since there would likely be a number of adjudicatory hearings requested by applicants objecting to the imposition of conditions. The actual man-years required to prepare for and hold these hearings are unknown.

An opportunity to contest the environmental review process would be available after the Areawide EIA has been issued through comment on the brief FONSI. Also, opportunity to review the NPDES conditions would be available through the standard permit review process.

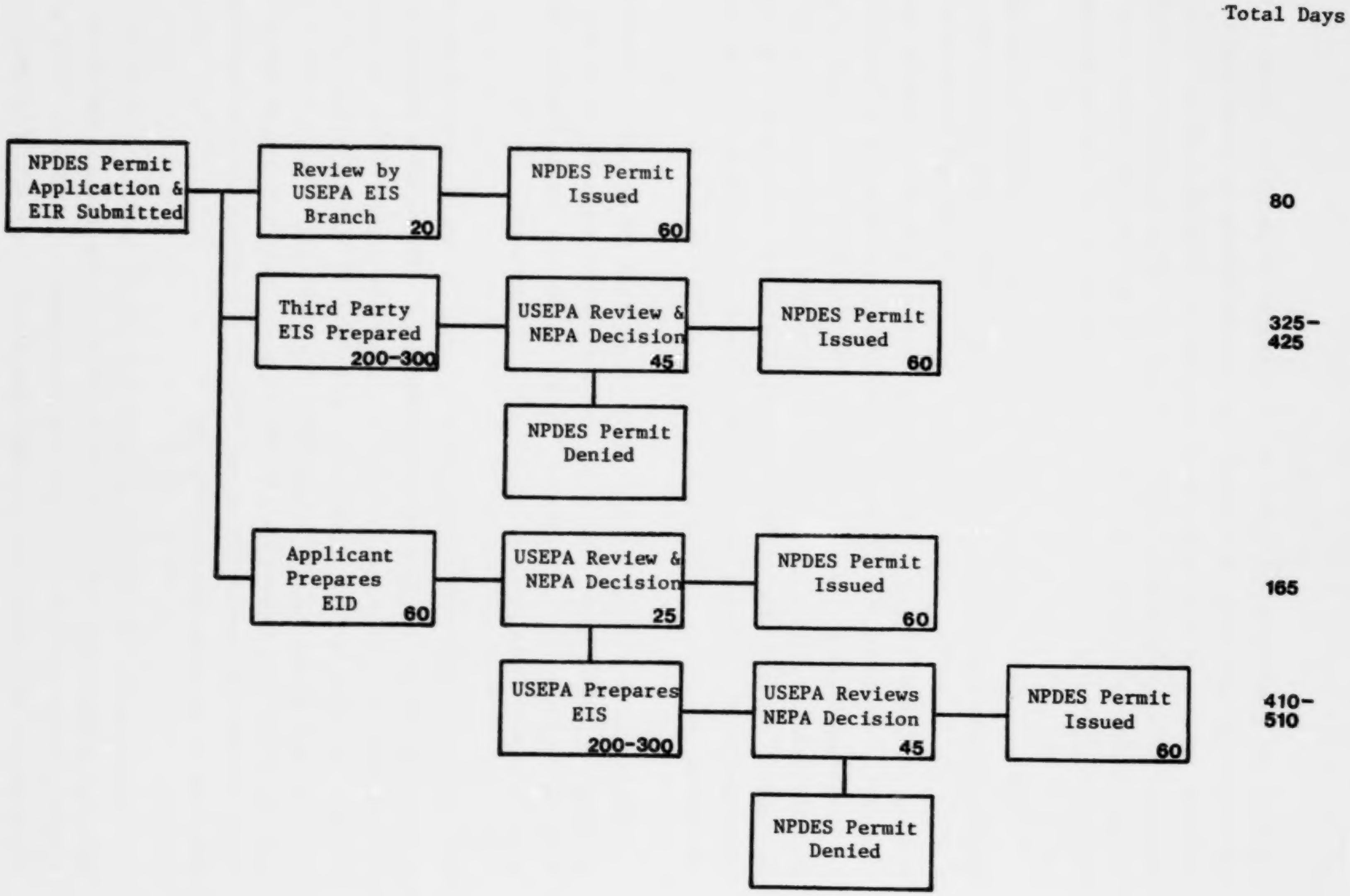
Several problems could be encountered with this method of using conditions. General conditions are by their nature a quick but inflexible regulatory mechanism. Site-specific analysis and documentation of the appropriateness of any conditions would be lacking. Providing the site-specific documentation to support conditions in an adjudicatory hearing would not be possible. This option would make it more difficult for an innovative and potentially more effective control measure to be instituted. This could potentially contribute to stifling new ideas in impact mitigation.

5.3.4 Areawide-Individual Combined Review Alternative

This alternative combines the last two general approaches described into a single strategy using the Resource Threshold Criteria. This Areawide EIA, together with site-specific information provided by the applicant, would be the substantive basis for satisfying USEPA's NEPA responsibility for those New Source coal activities which do not create significant adverse environmental impacts (i.e., those which are considered below Level I for each of the Resource Threshold Criteria). Where applications trigger Level I, individual environmental reviews would be undertaken. Figure 5.3-3 indicates the various levels of review and corresponding time requirements that could result using this alternative.

This approach would involve an initial review to determine whether additional information is needed to determine if significant impacts are likely to occur from the proposed project. If not, a fast track permit and brief FONSI statement issuance process would occur. If the initial review indicated that there is the possibility of significant impact, then specific additional questions would be asked of the applicant. The USEPA would then evaluate this information to determine if significant impacts are likely. If not, a FONSI would be issued. If the determination is that significant impacts are likely, then the applicant would be required to develop and evaluate specific alterna-

Figure 5.3-3. Areawide-Individual Combined Review Alternative for NEPA review process for the issuance of New Source coal mining NPDES permits in western Kentucky.


Total Days
NPDES Permit Application & EIR Submitted
Review by USEPA EIS Branch
20
NPDES Permit Issued
60
80
Third Party EIS Prepared
200-300
USEPA Review & NEPA Decision
45
NPDES Permit Issued
60
325-425
NPDES Permit Denied
Applicant Prepares EID
60
USEPA Review & NEPA Decision
25
NPDES Permit Issued
60
165
USEPA Prepares EIS
200-300
USEPA Reviews NEPA Decision
45
NPDES Permit Issued
60
410-510
NPDES Permit Denied

Numbers represent estimated days required to complete each action.

tives to the proposed project that would mitigate the potential impact. If the impact can reasonably be mitigated and the mitigation is acceptable to the applicant, then a permit condition stipulating the mitigative action would be imposed. If not, the Agency would prepare an EIS fully analyzing the impact of the proposed project and any alternatives. A more detailed description of this procedure using the Resource Threshold Criteria is provided in Section 5.2.

This alternative utilizes a process where NEPA requirements for mining operations with insignificant impacts would be satisfied very rapidly and with a minimum of resources. USEPA would cite the Areawide EIA and the finding that no significant impacts would be expected when no Level I criterion was triggered. The public notice on the permit would reference the Areawide EIA for NEPA compliance for these insignificant projects and would contain a brief standard FONSI statement. If significant issues are raised contesting the adequacy of the environmental decision that led to the draft permit, an individual review of the mining operation could result. Such issues would be raised through the use of the Public Comment Criteria (Section 5.2.1).

Depending on the significance of the identified impact and its ability to be mitigated, additional information, an alternatives analysis, or an EIS would be required. It is estimated that 70% of all New Source applications would follow the fast track procedure using this strategy.

This alternative has the potential to result in significant environmental benefits to the Western Kentucky Coal Field area. The Resource Threshold Criteria have been developed to focus environmental review efforts on the most significant impact areas. Significant mitigation of adverse impacts on sensitive terrestrial and aquatic ecosystems, from noise due to truck traffic, from dust emanating from unpaved haul roads, on groundwater quality, on water supply intakes, on archaeological and historical resources, on recreational land, and on wetlands would be realized.

Approximately 0.6 manyears would be required to handle the workload anticipated using this compliance alternative. An additional $100,000 is estimated to be required to prepare the site-specific analyses or EIS's where the applicant determined that the conventional EIS route should be used.

This alternative has advantages in the time necessary to process a permit. In comparison to time frames for existing procedures, processing times under the Areawide-Individual Combined Review Alternative would be reduced substantially:

- From the date the applicant responds to the initial questions and additional questions (if required):
  - immediate screening and draft NPDES permit preparation if the application does not trip any initial thresholds (i.e., an insignificant impact), or
  - 20 days for an applicant response and 20 additional days to a USEPA decision (i.e., FONSI or alternatives analysis) where an application trips one or more initial threshold and additional questions are involved.
- Alternatives Analysis - approximately 60 days for applicant response plus 25 days for a USEPA NEPA decision.
- EIS - 200-300 days or more to complete.
- The time frame required to prepare and circulate the NPDES permit is in addition to these time frames. It is projected that an additional 60 days is required to complete permit issuance.

This alternative has the potential of employing a direct, expedient approach for those operations with little environmental effect, while retaining a method to effect environmental protection and impact mitigation for operations with potentially significant adverse impacts. This alternative would fully comply with USEPA statutory requirements for NEPA compliance, and would thus be legally defensible. Further, the flexibility of this alternative is higher than any others except the general conditioning approach described below.

A variation of this strategy could also be used to include the option of conditioning a permit at an earlier stage. The general conditioning approach could be modified to make use of the Resource Threshold Criteria to insert standard NEPA based permit conditions related to the site-specific environmental impacts. When a permit application is received by USEPA, a determination could be made as to whether or not the proposed operation meets or exceeds any Level I Resource Threshold Criteria. If it does, standard conditions would then be inserted in the NPDES permit. A brief standard FONSI statement would be included in the notice of each permit.

This alternative would result in potentially significant environmental benefits. Every permit triggering a Level I criteria would have the imposition of a permit condition. Although the condition might not be appropriate in every case, this approach could be argued to be environmentally conservative for those resource areas covered.

This option would require additional effort for review to determine when a condition would be required due to meeting or exceeding Level I criteria. There would also be additional resources required under this option as with the previous general conditioning option since adjudicatory hearings could be expected. The actual number of man-years required is unknown, but would likely be less than the conditioning option without the initial review.

An opportunity to contest the environmental review process could be argued to be available after the Areawide EIA has been issued through review of the brief FONSI included in the permit notice. Opportunity to review the NPDES conditions and to comment on their consistency with the areawide requirements would also be available through the standard permit review process.

This alternative is more flexible than the general conditioning option, but suffers from the same basic problems. The initial information submitted in the applicant questionnaire would rarely be sufficient to fully document the need for the specific permit conditions. Standard conditions are by their nature a quick but inflexible regulatory mechanism. Site-specific analysis and documentation of the appropriateness of any conditions would still be lacking. Providing site-specific documentation to support conditions in an adjudicatory hearing would not be possible. This option would also make it more difficult for an innovative and potentially more effective control measure to be instituted. This could again contribute to stifling new ideas in impact mitigation.

5.3.5 Areawide-Subareawide-Individual Combined Review Alternative

This strategy is virtually identical to the Areawide-Individual Combined Review Alternative with one additional option. If the region which surrounds a proposed permit area: (1) has similar sensitive resources; (2) is projected to be the focus of intense coal mining interests; or (3) has the potential for significant cumulative impacts on the watershed, USEPA may decide to conduct its own subareawide review prior to permit issuance. This review could ultimately reduce the number of New Sources in the subarea requiring individual analysis by establishing standard mitigative measures for mining activities within its boundaries. USEPA review time and applicant costs for providing detailed information should be reduced. Although it is doubtful that USEPA would make frequent use of this subareawide review approach, it would further increase the Agency's flexibility. Figure 5.3-4 indicates the various levels of review and corresponding time requirements resulting from this alternative.

This strategy outlines an approach based on options to evaluate permits on any level. The environment would be adequately protected against adverse impacts from mining operations and USEPA resource requirements would be relatively low. Overall, processing time requirements would be reduced as described under the Areawide-Individual approach (unless a subareawide review was required which would necessitate a longer time frame).

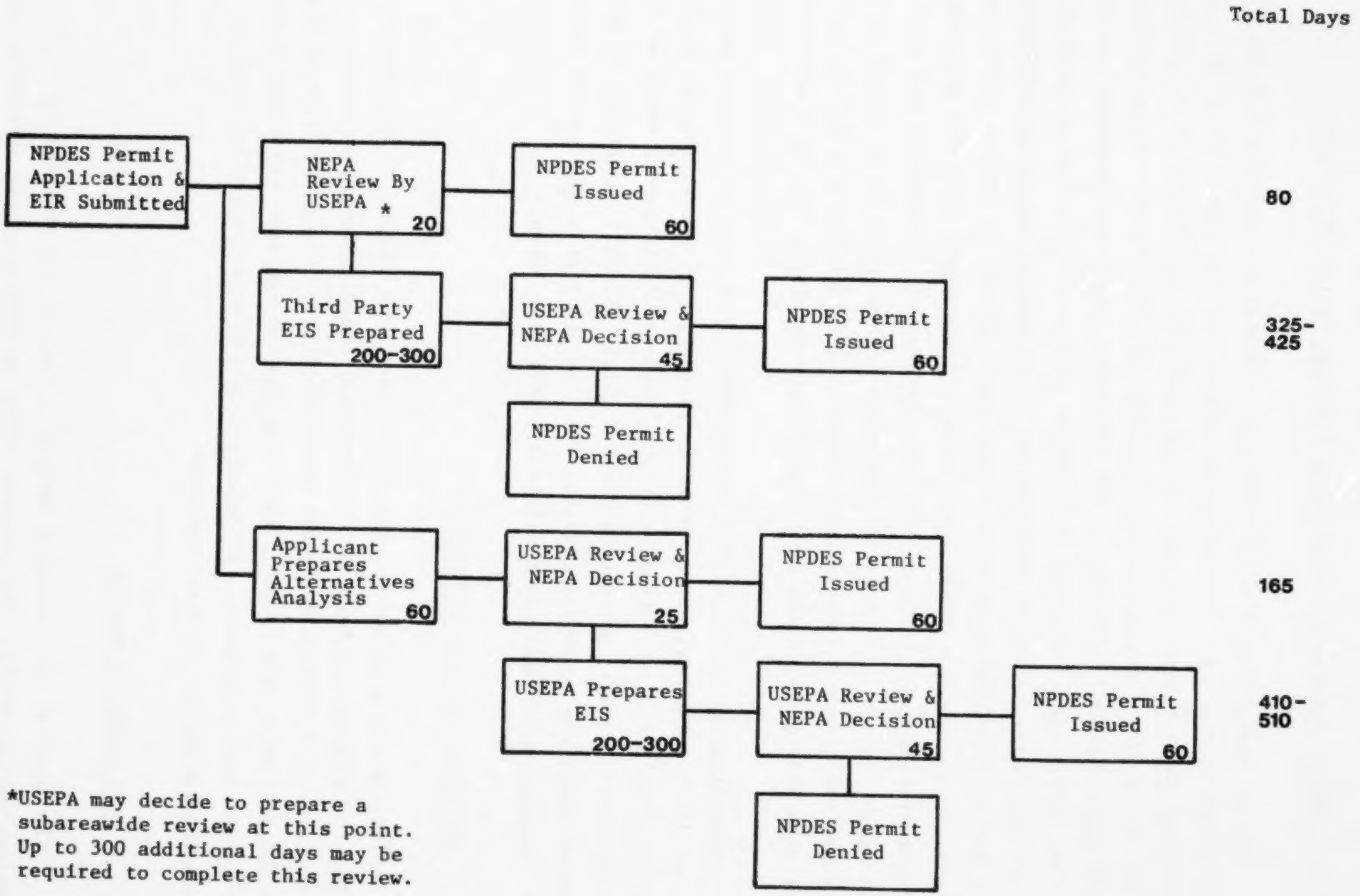
5.4 COMPARISON OF ALTERNATIVES

Each of the alternatives described above have advantages and disadvantages in terms of the level of environmental benefit, costs, processing time, compliance with USEPA's statutory responsibilities, the elimination of duplication of effort, and flexibility. This section compares the alternatives in terms of these parameters. A comparison of the alternatives by specific resource categories is also presented.

5.4.1 Environmental Benefit

The level of environmental benefit or protection provided by the alternatives varies widely. The greatest level of environmental protection is

Figure 5.3-4. Areawide-Subareawide-Individual Combined Review Alternative for NEPA review process for the issuance of New Source coal mining NPDES permits in western Kentucky.


Total Days
NPDES Permit Application & EIR Submitted
NEPA Review By USEPA * 20
NPDES Permit Issued 60
80
Third Party EIS Prepared 200-300
USEPA Review & NEPA Decision 45
NPDES Permit Issued 60
325-425
NPDES Permit Denied
Applicant Prepares Alternatives Analysis 60
USEPA Review & NEPA Decision 25
NPDES Permit Issued 60
165
USEPA Prepares EIS 200-300
USEPA Review & NEPA Decision 45
NPDES Permit Issued 60
410-510
NPDES Permit Denied

*USEPA may decide to prepare a subareawide review at this point. Up to 300 additional days may be required to complete this review.

Numbers represent estimated days required to complete each action.

afforded by the Individual Review Alternative while the least amount of protection is provided by the Areawide Review Alternative. The two combined review alternatives also provide for a level of environmental protection similar to the Individual Review Alternative.

The Individual Review Alternative provides the highest level of environmental protection through the project-specific review required of all proposed New Source mining operations. These individual project reviews would utilize the Resource Threshold Criteria to determine possible impacts to surface water quality and quantity including threatened and endangered aquatic species habitats; groundwater quality and quantity; sensitive terrestrial ecosystems including threatened and endangered species habitats; wetlands; sensitive noise receptors such as residences, schools, and health care facilities; sensitive fugitive dust receptors located along unpaved public haul roads; environmentally significant agricultural land except those prime farmlands already protected by SMCRA provisions; recreational land; and those historic or archaeological sites considered eligible for inclusion on the National Register of Historic Places. USEPA has identified these resource areas as being sensitive to coal mining activities, not protected by other Federal or State regulations, and requiring protection under NEPA. In addition to these resource areas, USEPA can respond to other significant adverse impacts that may be identified through the public comment process which allows the general public, other Federal agencies, and State and local governments to voice concerns about aspects of a particular mining operation. Through this individual review process, USEPA can provide the maximum level of environmental benefit.

At the opposite end of the spectrum, the Areawide Review Alternative provides little environmental protection. This alternative does not provide for site-specific environmental reviews of proposed New Source mining operations, therefore no protection against unique site-specific adverse impacts would result. Some environmental protection could result using the general conditioning option which requires mitigation of impacts through general permit conditions; however, conditions would not be tailored to site-specific impacts. Little environmental benefit would be realized through the Areawide Review Alternative.

Both the Areawide-Individual and Areawide-Subareawide-Individual Combined Review Alternatives provide a high level of environmental protection. As in the Individual Review Alternative, the Resource Threshold Criteria would be utilized to determine possible impacts to each of the ten resource areas identified by USEPA. Unlike the Individual Review Alternative, an initial review of the proposed mining operation could result in prompt permit issuance if significant adverse impacts are not identified (no Level I thresholds are met). In effect, these combined review alternatives will provide for a project-specific environmental review when the possibility of adverse impacts is identified while allowing for fast-track permit processing when significant impacts are not expected. The implementation of either of these alternatives would result in a substantial level of protection of surface water and groundwater, sensitive aquatic and terrestrial ecosystems, wetlands, environmentally significant agricultural land, recreation land, sensitive noise receptors, sensitive receptors of fugitive dust, and historic and archaeological sites as described above for the Individual Review Alternative. Under this alternative some significant impacts could occur should significant effects occur which are not covered by the Resource Threshold Criteria, or in those instances where other agencies fail to meet their responsibilities.

5.4.2 Manpower and Costs

The additional manpower requirements necessary for USEPA to implement the various alternatives ranges from zero with the Areawide Review Alternative, to approximately 0.6 manyears for the Areawide-Individual and Areawide-Subareawide-Individual Review Alternatives, to 1.2 manyears for the Individual Review Alternative. Estimated USEPA financial commitments for the preparation of site-specific EIS's would range from zero with the Areawide Review option to $100,000 with the Areawide-Individual and Areawide-Subareawide-Individual Review Alternatives. NPDES permit applicants will incur costs for supplying environmental data and preparing the alternatives analysis or EIS's that might be required under some of the review alternatives. No costs would be incurred by applicants under the Areawide Review Alternative since no environmental data or EIS's are required in order to obtain the NPDES permit. With the Individual, Areawide-Individual, or Areawide-Subareawide-Individual Alternatives, USEPA has estimated the applicants would spend a total of $1.0 million annually to provide the environmental data required by USEPA. This cost figure is based on the 70 New Source NPDES permit applications expected annually from western Kentucky. Applicants would spend significantly more than this amount to provide the mining plans and other data necessary to obtain the BSMRE mining permit under the permanent program. The costs associated with obtaining the NPDES permits are minute when compared with the $1.1 billion in annual revenues generated by coal mining in the Western Kentucky Coal Field.

5.4.3 Processing Time

The amount of time required by USEPA to process an NPDES permit application from the receipt of all information required of the applicant will vary with each alternative. The Individual Review Alternative would require a minimum of 80 days if a FONSI were issued to up to 500 days if an EIS were required. The Areawide Review Alternative would require only 60 days to issue a permit since no individual environmental reviews would be performed on the proposed mining operations under this alternative. Using the Areawide-Individual Combined Review Alternative an NPDES permit could be processed within 60 days if the initial review of the environmental information indicates no significant impacts will occur. Otherwise, permit issuance would require from 80 to up to 500 days as in the Individual Review Alternative. Processing time for the Areawide-Subareawide-Individual Combined Review Alternative would be the same as for the Areawide-Individual Combined Review Alternative unless a subareawide review were required. Subsequent permit applications located within the subarea could be expedited as with the areawide approach, however, after the subareawide review is completed.

5.4.4 Compliance With USEPA's Statutory Responsibilities

USEPA's statutory responsibilities would be fully met using the Individual Review, Areawide-Individual Combined Review, or the Areawide-Subareawide-Individual Combined Review Alternatives. The No Action Alternative and the three options available under the Areawide Review Alternative present the likelihood of legal challenges occurring because of the lack of consideration of site-specific issues.

5.4.5 Duplication of Effort

In terms of eliminating the duplication of effort of other agencies, the Individual Review Alternative is least desirable because resource areas that other agencies are responsible for would also be reviewed by USEPA. The three options under the Areawide Review Alternative do not include site-specific environmental reviews; therefore, no duplication of effort would occur. The Areawide-Individual and Areawide-Subareawide-Individual Combined Review Alternatives include reviews of environmental resource areas not covered by other agencies, therefore eliminating the possibility of duplication of effort while still providing environmental protection.

5.4.6 Flexibility

In terms of the ability of an alternative to identify and mitigate site-specific impacts and allow expedient permit processing, the Individual Review Alternative has complete flexibility whereas the options available under the Areawide Review Alternative are very restrictive and have virtually no flexibility. The Areawide-Individual and Areawide-Subareawide-Individual Combined Review Alternatives combine the flexibility of the Individual Review Alternative and significantly simplify permit processing.

5.5 THE SELECTED ACTION

5.5.1 Overall Recommendation

The results of the analysis of alternatives indicate that the Areawide-Subareawide-Individual Combined Review Alternative would best fulfill USEPA's responsibilities. All of the alternatives and their variations present distinct advantages over the NEPA compliance process currently used by USEPA. The Individual Review Alternative and the Areawide Review Alternative with the FONSI option are on either end of the NEPA compliance spectrum. They differ dramatically in terms of environmental benefits, USEPA resource demands, overall processing time requirements, and flexibility to accommodate specific situations. From an environmental protection perspective, the former approach is highly preferable. However, the USEPA resources required are not reasonable given the current personnel and funding allocations. The Areawide FONSI, on the other hand, is superior from a cost, processing, and manpower standpoint, but deficient in terms of environmental benefits, ability to withstand legal challenges, and flexibility. The Areawide-Subareawide-Individual Combined Review Alternative, however, provides a high level of environmental benefits with moderate manpower and financial requirements and a greater degree of flexibility to accommodate specific problems that may occur during the permit review process.

The Areawide-Subareawide-Individual Combined Review Alternative is selected as the Proposed Action because it provides USEPA with the greatest number of options and flexibility in performing its NEPA-related duties. There are, however, certain consequences--both positive and negative--that will result from implementing this alternative.

5.5.2 Permit Review Procedure

Using the Selected Action, a step-by-step procedure would be followed to accomplish the environmental reviews required under NEPA for New Source NPDES permit issuance. Generally, this procedure is as follows:

1. Determine if applicant is classified as a New Source.
2. Applicant provides environmental information.
3. USEPA reviews environmental information.
4. An Environmental Impact Assessment (EIA) and FONSI (both standardized) are issued if no Level I Resource Threshold Criteria (RTC) are triggered.
5. If Level I RTC is triggered applicant supplies additional data from which the significance of the impact can be determined.
6. If impact is determined to be insignificant or mitigatable, an Environmental Impact Assessment (EIA) and FONSI is prepared.
7. If a Level II RTC is triggered, an alternatives analysis is prepared by applicant.
8. If a Level III RTC is triggered, an EIS is prepared by USEPA or third party contractor.

9. Issue permit, issue permit with conditions, or deny permit.

Using the Proposed Action, the review of NPDES permit applications would be significantly streamlined while maintaining a high level of environmental protection.

6.0 CONSEQUENCES OF THE SELECTED ACTION

The implementation of the Selected Action, the Areawide-Subareawide-Individual Combined Review, will result in both adverse and beneficial impacts on the environment of the Western Kentucky Coal Field, on applicants for New Source coal mining NPDES permits in the Coal Field, and on USEPA. Impacts on the environment are described in terms of the level of protection provided for the sensitive resources of western Kentucky by the Selected Action. Impacts to the New Source coal mining NPDES permit applicants and USEPA are described in terms of temporal effects, manpower requirements, and/or financial impacts.

6.1 ENVIRONMENTAL CONSEQUENCES

The Selected Action has been developed to provide for environmental reviews of New Source coal mining activities with a sufficient level of detail to identify probable adverse impacts to sensitive resources. The resources that have been identified as particularly sensitive to coal mining activities and that are not protected by other Federal or State regulatory programs include surface water, groundwater, sensitive ecosystems identified by KNPC, wetlands, significant agricultural land as defined by USEPA national policy, recreational land, noise, air quality, and cultural resources.

The Selected Action will provide protection for certain sensitive surface water resources that occur within five miles downstream of a proposed effluent discharge. These resources include stream segments that are: (1) designated or proposed for domestic water supply; (2) designated or proposed as coldwater aquatic habitat; (3) designated or proposed as an Outstanding Resource Water of the Commonwealth; (4) identified as a Sensitive Aquatic Ecosystem by KNPC; (5) identified as a high or moderate water quality stream by KNPC; and (6) likely to be inhabited by a Federally listed or proposed species in danger of extinction or threatened with endangerment. Under the Selected Action, a proposed mining operation with a discharge that occurs within five miles upstream of one of these sensitive stream segments would be reviewed in more detail in order to assess the exact nature of possible impacts on the sensitive resource. This procedure assures the protection of the resource against mining-related impacts that may alter species composition, reduce water use opportunities, or otherwise adversely impact the sensitive characteristics of the resource.

Groundwater quality and quantity would be protected by the review procedure incorporated in the Selected Action. The existance of private water supply wells within 2,000 feet of the permit area of a proposed coal preparation plant or mine permit area, and public water supply wells within one mile of the proposed permit areas would initiate site-specific groundwater reviews (if the producing aquifer is not hydraulically separated from potential pollution sources such as spoil stockpiles and refuse disposal areas). In this way, the quality and quantity of local groundwater resources can be considered by requiring permit applicants to investigate alternatives and address mitigative measures in more detail.

Sensitive terrestrial ecosystems as identified by KNPC and areas identified by KNPC that are likely to be inhabited by Federally listed or proposed species in danger of extinction or threatened with endangerment would be considered for possible adverse mining impacts by the Selected Action. Mining-related surface disturbances within 2,000 feet of sensitive terrestrial ecosystems will require additional investigations by the applicant and USEPA to determine the possibility of adverse impacts on the area. If significant adverse impacts are determined likely to occur from the proposed mining operation, mitigative measures will be developed to reduce or eliminate the impacts to acceptable levels before issuance of the NPDES permit.

Wetlands would be addressed by the Selected Action through the site-specific review to be initiated if the proposed mining-related surface disturbances occur within or adjacent to wetlands. The site-specific review would also be required when coal mining operations discharge wastewater into or hydraulically modify a wetland area. The site-specific review will determine the significance of any impacts occurring to wetlands so that mitigative measures can be developed to minimize adverse impacts.

Impacts to Environmentally Significant Agricultural (ESA) lands as defined by USEPA national policy would be addressed by the site-specific review requirements of the Selected Action. Coal mining activities, exclusive of coal haul roads and preparation plant sites, that cause surface disturbance on ESA land, except those prime farmlands protected by SMCRA, will be reviewed on a case-by-case basis to determine the significance of impacts and develop mitigation where appropriate. This review procedure will minimize the permanent conversion of ESA land and promote the protection of this valuable natural resource.

The Selected Action will address impacts to recreational land from coal mining activities. Proposed coal mining operations, including public and private haul roads, located within 2,000 feet of a public park, National Park, National Wildlife Refuge, State Wildlife Management Area, National System of Trails, Wilderness Area, or State or National Wild, Scenic, or Recreational River will receive individual reviews to determine the possibility and significance of adverse impacts caused by noise pollution, air pollution, or other forms of pollution that would degrade the quality of recreational opportunities at the facility. This review and the resultant mitigative measures or permit action will allow protection of recreational lands from significant adverse impacts of mining operations where approprite.

The Selected Action will preserve air quality in the Coal Field by protecting sensitive receptors from unhealthy levels of fugitive dust emissions that may result from coal haul truck traffic on unpaved off-site haul routes. Proposed mining operations that would generate enough truck traffic on unpaved haul routes to exceed the National Ambient Air Quality Standards for total suspended particulates at nearby sensitive receptors (as determined by a simple nomograph) would be reviewed individually in order to determine the significance of possible impacts. Alternative haul routes or other mitigative measures would be required before the NPDES permit is approved if significant adverse impacts are likely to occur.

Sensitive noise receptors such as residences, health care facilities, churches, or educational facilities located near mines or along coal haul routes will be protected from exposure to excessive mining-related noise by the Selected Action. If sensitive receptors are expected to experience an L_{eq} of 70 dBA from coal haul truck traffic, a site-specific review would be performed to determine more accurately what noise levels will be generated by the proposed activity. Mitigative measures will be required to reduce noise emissions exceeding an L_{dn} of 73 dBA or an L_{eq} of 70 dBA at sensitive receptors, thereby minimizing adverse effects from exposure to mining-related noise levels.

The Selected Action will provide protection for cultural resources (historic, archaeologic, and paleontologic sites) of the Western Kentucky Coal Field from significant adverse impacts of coal mining operations by requiring the permit applicant to obtain clearance from the Kentucky SHPO and/or OSA. If the SHPO or OSA determines that the permit area contains resources that are listed on the National Register of Historic Places or are eligible for inclusion on the National Register and that coal mining operations are likely to have significant adverse impacts on the resource, mitigative measures will be developed to preserve the resource as a condition to permit issuance. USEPA will work closely with the SHPO and/or OSA in the review and protection of cultural resources.

The sensitive resources described above are reviewed and the degree of impact assessed by using the Resource Threshold Criteria. In addition, local, State, and Federal agency review comments as well as review comments from the general public provide for the identification of possible significant impacts not otherwise addressed by USEPA. Where significant adverse impacts are determined likely to occur, they can be resolved by the application of permit conditions that mitigate the adverse impact or the preparation of an EID and/or EIS which describes mitigative measures to be taken in the form of feasible alternatives.

USEPA has determined that some environmenal resource areas such as floodplains, steep slopes, transportation networks, etc. are adequately protected from the adverse impacts of coal mining by the regulations of other Federal or State agencies. To avoid duplicating the efforts of these other agencies, USEPA will not perform its own review of these resources. Instead, USEPA will rely on the review and permit requirements of the appropriate agency to fulfill its responsibilities. Should those agencies fail to meet their responsibilities, significant advese impacts could occur which would not be addressed by USEPA through this review process.

In summary, the Selected Action provides an environmental review mechanism that can identify significant adverse impacts early in the review process so that a detailed, site-specific investigation can be instigated prior to permit approval. Those projects for which no significant adverse impacts are identified in the initial review can be permitted rapidly while still providing an adequate level of environmental protection.

6.2 TEMPORAL EFFECTS

The implementation of the Selected Action will streamline the permit review process, thereby reducing the time required to process the NPDES permit application considerably. Both the permit applicant and USEPA will benefit from this time savings. For example, if no significant environmental impacts are encountered during the initial review, the final NPDES permit could be issued in approximately 60 days. If the initial RTC are triggered but further investigation indicates the impacts are not significant or the applicant agrees to accept appropriate mitigative measures and permit conditions, approximately 80 days would be required for final permit issuance. In cases where an EID and/or EIS is required, permit issuance could require from 165 to more than 300 days depending on the complexity of the issues to be resolved. The vast majority of permits will likely be issued within the 60 to 80 day time frame.

6.3 USEPA MANPOWER REQUIREMENTS

The manpower requirements necessary for USEPA to fully implement the Selected Action are moderate. Based on an estimated 70 permit applications per year, approximately 0.6 USEPA manyears of effort would be needed to adequately implement the review process. This compares favorably to the estimated 7 manyears that would be required to perform NEPA compliance reviews utilizing conventional methods.

6.4 FINANCIAL IMPACTS TO USEPA AND PERMIT APPLICANTS

The costs of implementing the Selected Action would be borne by both USEPA and permit applicants. Based on the estimated 70 NPDES permit applications to be processed annually, USEPA would expect to spend an estimated $100,000 for the preparation of EIS's not prepared under the third-party system. The permit applicants as a group are estimated to require a total financial commitment of approximately $1.0 million per year under the Selected Action. This estimated cost to applicants would be required to initially supply data for USEPA review, to obtain additional data, and to prepare EID's and EIS's as needed. This cost to New Source NPDES permit applicants is relatively small when compared to the costs associated with obtaining mining permits or the revenues that are derived from the sale of coal mined in western Kentucky.

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APPENDIX A

RESOURCE THRESHOLD CRITERIA

RESOURCE THRESHOLD CRITERIA

Given the existing level of protection afforded by current State and Federal regulations, USEPA must consider the environmental effects of permitting activities related to New Source coal mining NPDES discharges on the following resource areas:

- surface water and groundwater
- sensitive ecosystems
- wetlands
- environmentally significant agricultural lands
- recreational lands
- noise
- historic, archaeologic, or paleontologic sites
- air quality
- public comment

Under the provisions of NEPA, USEPA is required to make every reasonable effort to preserve and enhance the quality of the environment through the protection of these resources. The resource areas listed above are not adequately protected by the State or by Federal agencies other than USEPA. Therefore, pursuant to NEPA requirements, it is the responsibility of USEPA to ensure that every effort is made to protect them. In an effort to provide such protection, USEPA may choose to establish a set of Resource Threshold Criteria for each resource area. The following sections identify possible RTC for each area.

SURFACE WATER

Level I Criterion - There are receiving stream segments within 5.0 stream miles downstream of the proposed discharge:

- designated or proposed for designation as a domestic water supply; or
- designated or proposed for designation as coldwater aquatic habitat; or
- designated or proposed for designation as an Outstanding Resource Water of the Commonwealth; or
- likely to be inhabited by a Federally listed or proposed species in danger of extinction or threatened with endangerment as identified by KNPC; or

- identified as a Sensitive Aquatic Ecosystem by KNPC; or

- identified as a high or moderate water quality stream by KNPC.

Level II Criterion - Proposed coal mining operations are likely to have a significant adverse impact on the characteristics of the stream segments listed in the Level I criterion which make them unique, outstanding, or otherwise significant.

Level III Criterion - Proposed coal mining operations will have a significant adverse impact on the characteristics of the stream segments listed in the Level I criterion which make them unique, outstanding, or otherwise significant which has not or cannot be mitigated.

GROUNDWATER

Level I Criterion - Private water supply wells, except those used solely by the applicant, occur within 2,000 feet of a proposed underground permit area which has the potential to produce AMD, an AMD treatment sludge disposal area or a preparation plant coal storage or refuse disposal area, and no barrier is known to preclude hydraulic connection between a potential pollution source and producing aquifers, or

Public water supply wells occur within one mile of a proposed underground permit area, an AMD treatment sludge disposal area, or a preparation plant coal storage or refuse disposal area, and no barrier is known to preclude hydraulic connection between a potential pollution source and producing aquifers.

Level II Criterion - There is likely to be a significant adverse impact on private or public water supply wells, except those used solely by the applicant.

Level III Criterion - Proposed coal mining operations will have an unmitigated significant adverse impact on public or private water supply wells, except those used solely by the applicant.

SENSITIVE TERRESTRIAL ECOSYSTEMS

Level 1 Criterion - Surface disturbance caused by coal mining operations proposed within 2,000 feet of: (1) a Sensitive Ecosystem identified by KNPC; or (2) an area identified by KNPC likely to be inhabited by Federally listed or proposed species in danger of extinction or threatened with endangerment as designated by the US Fish and Wildlife Service.

Level II Criterion - Surface disturbance caused by proposed coal mining operations is likely to have a significant adverse impact on the characteristics of the habitat or ecosystems defined by the Level I criterion which makes the habitat unsuitable for those sensitive ecosystems.

Level III Criterion - Surface disturbance by proposed coal mining operations will have a significant unmitigated adverse impact on the characteristics of the habitat or ecosystems defined by the Level I criterion which makes the habitat unsuitable for those sensitive ecosystems.

WETLANDS

Level I Criterion - Wetlands located within or adjacent to the area proposed for surface disturbance by coal mining activities.

Coal mining operations will discharge into or hydraulically modify a wetland area.

Level II Criterion - Proposed coal mining activities are likely to create a significant disturbance to wetland areas.

Level III Criterion - Proposed coal mining activities will create a significant unmitigated adverse impact to significant wetland areas.

ENVIRONMENTALLY SIGNIFICANT AGRICULTURAL LANDS

Level I Criterion - Prime farmlands cultivated less than 5 of the previous 10 years are proposed for surface disturbance by coal mining and preparation plant sludge disposal activities, exclusive of coal haul roads or preparation plant site facilities.

Level II Criterion - Proposed coal mining activities are likely to create a significant adverse impact on prime farmlands.

Level III Criterion - Proposed coal mining activities will irretrievably convert a signficant acreage of ESA lands.

RECREATION LANDS

Level I Criterion - Proposed coal mining operations, including coal-related private and public haul roads, are located within 2,000 feet of a public park, National Park, National Wildlife Refuge, State Wildlife Management Area, National System of Trails, Wilderness Area, State or National Wild, Scenic, or Recreational River.

Level II Criterion - Coal mining operations proposed are likely to have a significant adverse impact on the resources described in the Level I criterion.

Level III Criterion - Proposed coal mining operations will have a significant unmitigated adverse impact on the resources described in the Level I criterion.

NOISE

Level I Criterion - Coal production exceeds 1.5 million tons per year, and sensitive receptors are projected to experience an L_{eq} of 70 dBA from coal truck traffic on public or private haul roads (See attached nomograph for distance from the centerline of the road versus number of trucks per hour, and calculations showing the possibility of significant impact for operations with production of 1.5 million tons or more per year).

Level II Criterion - Coal haul truck traffic would produce an L_{eq} of 70 dBA at the closest sensitive receptor on coal haul roads identified under the Level I criterion after consideration of existing natural topographic or vegetative barriers or other site-specific conditions.

Level III Criterion - Proposed haul trucks would produce an L_{dn} of 73 dBA, or an L_{eq} of 70 dBA, at the closest sensitive receptor.

HISTORIC ARCHAEOLOGIC, AND PALEONTOLOGIC SITES

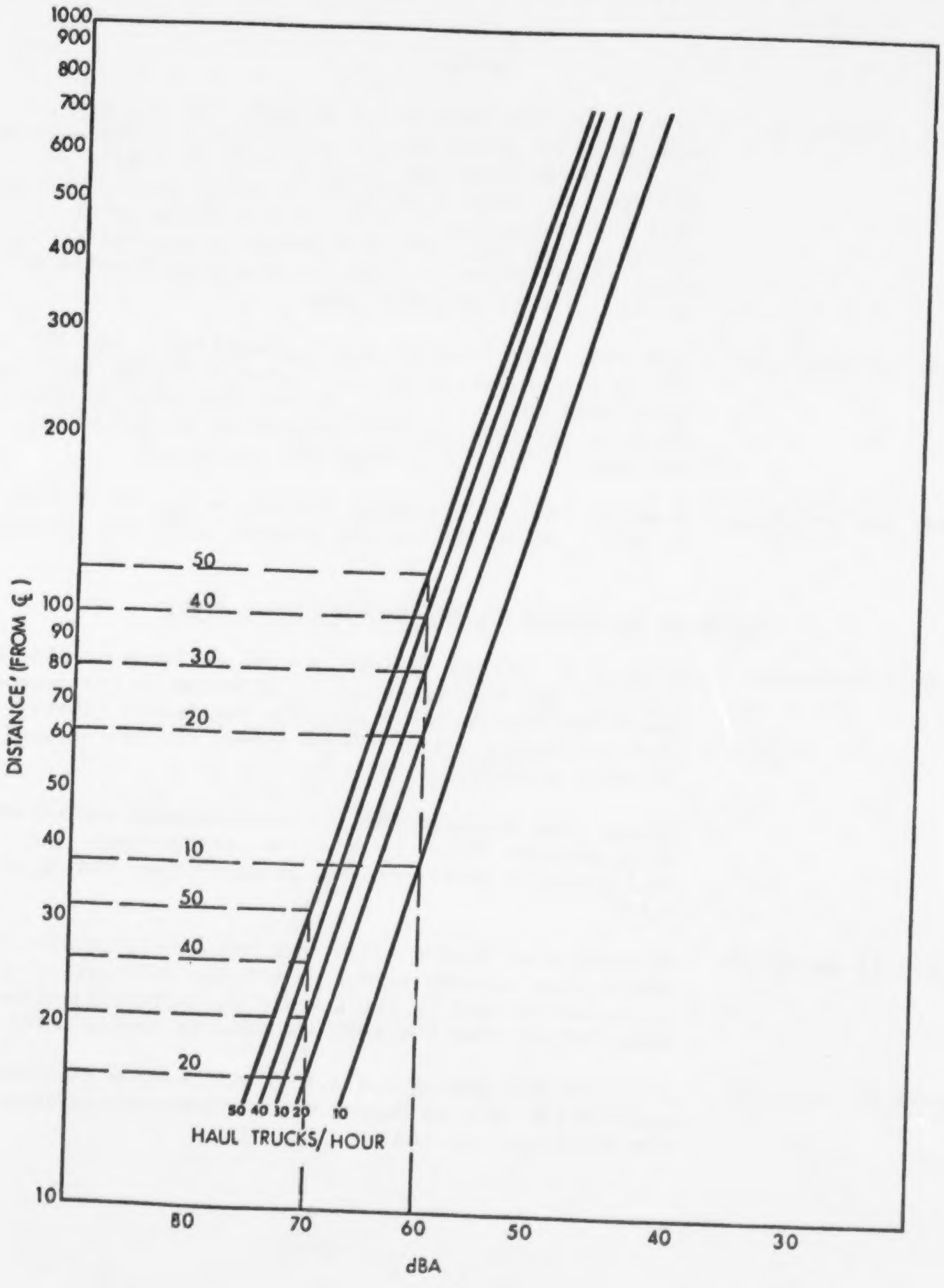
Level I Criterion - Absence of letters indicating that no known or eligible National Register sites may be affected by the proposed operation from Kentucky Heritage Commission (State Historic Preservation Officer (SHPO) and Kentucky Office of State Archaeology (OSA)).

Letter from Kentucky SHPO or OSA indicates the existence of an adverse impact on historic, archaeologic, or paleontologic resources from proposed coal mining activities.

Level II Criterion - Proposed coal mining operations are likely to have a significant adverse impact on the characteristics of the resources defined in the Level I criterion (requires consultation with the SHPO and OSA, as appropriate).

Level III Criterion - Proposed coal mining operations will have a significant unmitigated adverse impact on the resources defined in the Level I criterion.

Figure A-1. Nomagraph of estimated noise levels from mine haul roads.



RESOURCE THRESHOLD CRITERIA CALCULATIONS FOR NOISE

ASSUMPTIONS: Noise Nomagraph

70 dBA = Maximum acceptable noise level.

30 feet = Distance from centerline where expect to meet dBA of 70 from coal haul traffic.

50 = Number of passbys/hour to meet 70 dBA at 30 feet (25 loads/hour).

35T = Average capacity/haul truck.

8 = Hours/day of operation.

220 = Days/year of operation

At 25 loaded passbys per hour, each carrying 35 tons, 875 tons per hour, or 7,000 tons per day, or 1.5 million tons per year would represent the annual production rate which (given all assumptions) might indicate a significant noise impact to sensitive receptors 30 feet from the centerline of haul roads.

Operations meeting these criteria would be requested to identify haul roads proposed for use, and sensitive receptors along these routes which (according to the Noise Nomagraph) could be subjected to noise levels in excess of 70 dBA.

If a potential problem is documented, operations would be required to investigate alternatives and/or address mitigation.

AIR QUALITY

Level I Criterion - Coal production exceeds 350,000 tons/year and fugitive dust emissions created by coal haul truck traffic on unpaved public or private haul roads without controls may exceed National Ambient Air Quality Standards for total suspended particles at nearby sensitive receptors (e.g., residences, health care facilities, schools, churches, and public parks). (See attached nomagraph for distance from the centerline of the road versus number of trucks per day, and calculations showing the possibility of significant impact for operations with production of 350,000 tons or more per year).

Level II Criterion - Significant adverse impacts are likely to occur from proposed activities.

Level III Criterion - Mitigative measures are not sufficient to reduce emissions to below the level described in Level I. Unmitigated significant adverse impacts will occur from the proposed operation.

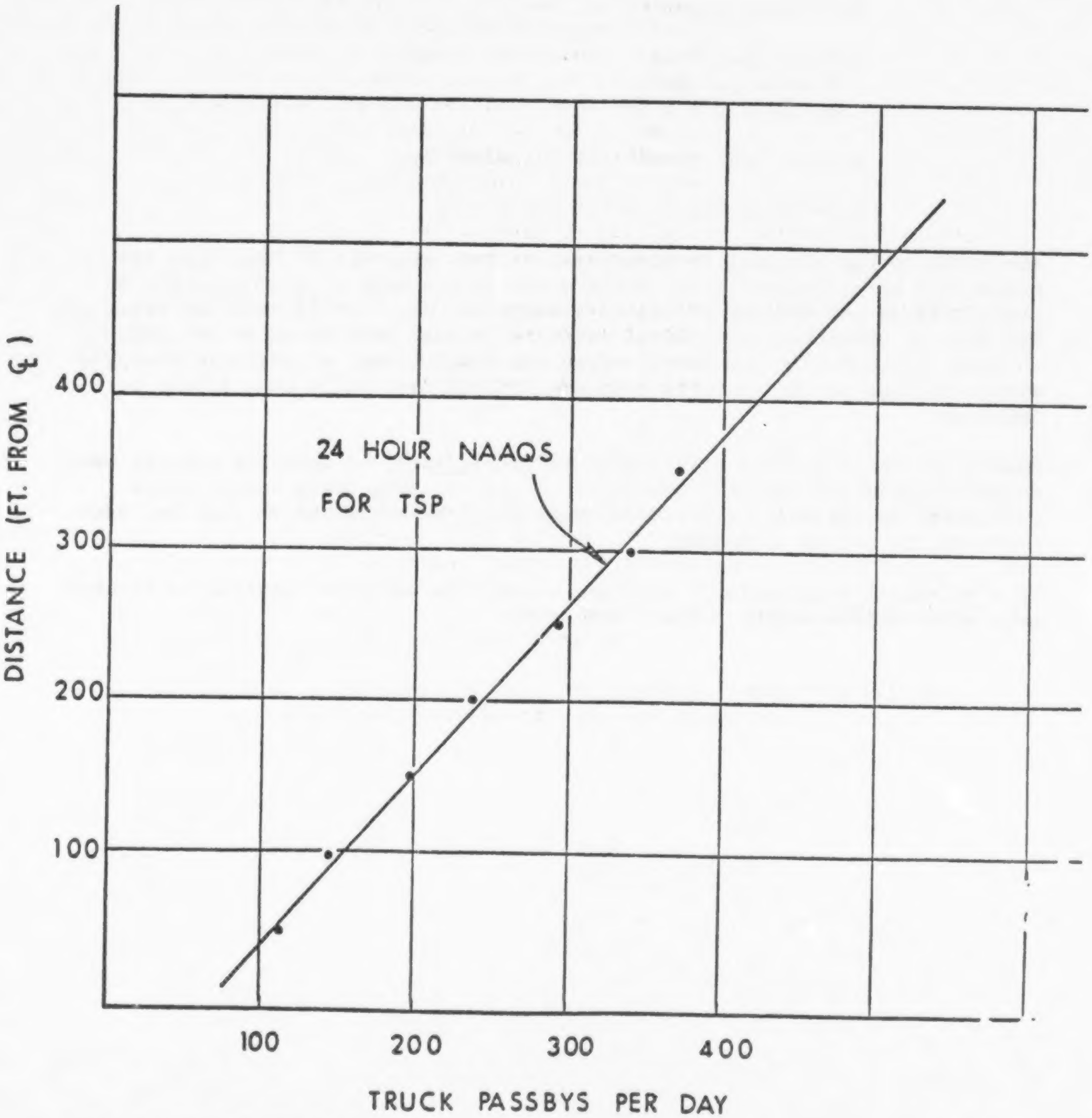
PUBLIC COMMENT

Level I Criterion - Significant issues raised by public, local, state, or Federal parties on a resource area not otherwise identified or adequately addressed.

Level II Criterion - Significant adverse impacts are likely to result to resource area identified under Level I.

Level III Criterion - Unmitigated significant adverse impacts will result to resource area identified under Level I.

Figure A-2. Nomagraph of estimated fugitive dust emissions from mine haul roads.



Task Report on Air Quality, Wapora, Inc., 1981. Prepared in connection with the East Kentucky Areawide EIS

RESOURCE THRESHOLD CRITERIA CALCULATIONS FOR FUGITIVE DUST EMISSIONS

ASSUMPTIONS: Air Quality Nomagraph

Haul Roads Unpaved

Average Operation:
8 hours per day
220 days per year

Average Haul Truck = 35 Ton Capacity

Each Truck Passby = 1/2 Round Trip

According to the Air Quality Nomagraph, at approximately 30 feet from the centerline of an unpaved road, NAAQS would be exceeded at approximately 90 truck passbys per day, or 45 loaded passbys per day. At 35 tons per truck for 220 days of operation, this would represent annual production of 346,500, or rounded, 350,000 tons per year. Given all assumptions, a sensitive receptor within 30 feet of the centerline of the unpaved road would thus likely be impacted.

Operations meeting these criteria would be requested to identify unpaved haul roads proposed for use, and sensitive receptors along these routes which (according to the Air Quality Nomagraph) could be subjected to fugitive dust emissions in excess of NAAQS.

If a potential problem is documented, operations would be required to investigate alternatives and/or address mitigation.

APPENDIX B

USEPA AND APPLICANT COSTS

USEPA AND APPLICANT COSTS

USEPA is anticipating issuing an annual average of 70 NPDES permits for New Source coal mines in the Western Kentucky Coal Field. A primary objective of this analysis of NEPA compliance strategies is to reduce the time and monetary expenditures associated with permit issuance. Thus, identification of the associated costs is essential to this study. The sections which follow present estimates of the costs associated with each of the three strategies. The costs are identified by resource area and include: (1) USEPA manpower requirements; (2) USEPA costs associated with EIS preparation and review; and (3) the monetary costs expected to be incurred by applicants. These costs are based on the number of permit applications expected to trigger each of the Resource Threshold Criteria levels as identified for each resource area.

In order to determine these costs, several assumptions are made in the analysis. Under the Areawide-Subareawide-Individual Strategy, USEPA's initial review of applications should take a total of 250 man-hours. The applicant's cost of submitting the information required for the initial review varies from $100 to $1,000 per resource area depending upon the activities proposed.

USEPA's review of additional information will vary among the resource areas and will depend upon the level of impacts associated with the proposed project. The review of additional questions is expected to be required for those projects with impacts which equal or exceed a Level I RTC. The USEPA manpower requirements for reviewing the additional questions are estimated to be about one hour each. The applicant's costs for submitting additional information should vary from $100 to $5,000 per resource area.

An evaluation of alternatives can be expected when impacts equal or exceed a Level II RTC. An alternatives evaluation would not be prepared, however, when a third party EIS is prepared. The time required for USEPA to review an alternatives analysis is expected to be approximately 10 man-hours and to cost the applicant about $5,000.

When a Level III RTC is equalled or exceeded, an EIS must be prepared either by the applicant or by USEPA. It is estimated that about 80% of the EIS's will be third party and paid for by the applicant. USEPA's review of a third party EIS is estimated to require about 160 hours per application. The applicant's cost for each third party EIS should be about $100,000. It is estimated that about 20% of the EIS's will be prepared by USEPA at a cost of approximately $100,000. The time required for USEPA to review the EIS is expected to total about 160 man-hours.

The total costs to USEPA and the applicant are determined by multiplying the number of permit applications expected to trigger each RTC level of a given resource area by the associated expenditures identified above. The USEPA costs and the applicant expenditures are totalled for all areas to derive summary estimates. From this analysis it appears that USEPA could spend 0.6 man-years using the Areawide-Subareawide-Individual Strategy. An estimated $100,000 would be spent in the preparation of EIS's.

The following sections summarize the costs associated with the NPDES review of New Source coal mines for the Western Kentucky Coal Field.

SURFACE WATER

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	48	12	2	1
Underground Mines	4	2	0	1
Preparation Plants	2	2	1	0
Total	54	16	3	2

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	16 hours
Review of alternatives analysis @ 10 hours each	30 hours
Review of EIS's @ 160 hours per EIS	320 hours
Total	366 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	$40,000 (100,000 x (20% of 2))

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $100 per application	$ 7,000 ($100 x 70)
Additional Questions @ $2,000 per application	$ 32,000 ($2,000 x 16)
Preparation of EID's and EIS's	(See Summary Table)

GROUNDWATER

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	36	24	3	1
Underground Mines	4	2	1	0
Preparation Plants	2	2	1	0
Total	42	28	5	1

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	28 hours
Review of alternatives analysis @ 10 hours each	50 hours
Review of EIS's @ 160 hours per EIS	160 hours
Total	238 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	$20,000 ($100,000 x (20% of 1))

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $800 per application	$ 56,000 ($800 x 70)
Additional Questions @ $1,000 per application	$ 28,000 ($1,000 x 28)
Preparation of EID's and EIS's	(See Summary Table)

ENVIRONMENTALLY SIGNIFICANT AGRICULTURAL LANDS

APPLICATIONS TRIPPING RTC LEVELS **(Annual Estimate)**

	< LI	LI	LII *	LIII *
Surface Mines	30	30	6	2
Underground Mines	3	3	1	0
Preparation Plants	2	2	1	0
Total	35	35	8	2

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS **(Annual Estimate)**

Review of Additional Questions **@ 1 hour per application**	35 hours
Review of alternatives analysis @ 10 **hours** each	80 hours
Review of EIS's **@ 160 hours** per EIS	320 hours
Total	435 hours

USEPA EXPENDITURES **(Annual Estimate)**

EIS Costs @ $100,000 **per EIS**	$40,000 ($100,000 x (20% of 2))

EXPENDITURES BY APPLICANTS **(Annual Estimate)**

Initial Questionnaire @ $400 per application	$ 28,000 ($400 x 70)
Additional Questions @ $100 per application	$ 3,500 ($100 x 35)
Preparation of EID's and EIS's	(See Summary Table)

RECREATION LAND

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	54	6	1	0
Underground Mines	5	1	0	0
Preparation Plants	3	1	0	0
Total	62	8	1	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	8 hours
Review of alternatives analysis @ 10 hours each	10 hours
Review of EIS's @ 160 hours per EIS	0 hours
Total	18 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @$100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $200 per application	$14,000	($200 x 70)
Additional Questions @ $400 per application	$ 3,200	($400 x 8)
Preparation of EID's and EIS's	(See Summary Table)	

SENSITIVE TERRESTRIAL ECOSYSTEMS

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	54	6	2	0
Underground Mines	6	0	0	0
Preparation Plants	4	0	0	0
Total	64	6	2	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	6 hours
Review of alternatives analysis @ 10 hours each	20 hours
Review of EIS's @ 160 hours per EIS	0 hours
Total	26 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $100 per application	$ 7,000	($100 x 70)
Additional Questions @ $1,000 per application	$ 6,000	($1,000 x 6)
Preparation of EID's and EIS's		(See Summary Table)

AIR QUALITY

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	56	4	1	0
Underground Mines	4	2	1	0
Preparation Plants	3	1	1	0
Total	63	7	3	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	7 hours
Review of alternatives analysis @ 10 hours each	30 hours
Review of EIS's @ 160 hours per EIS	0 hours
Total	37 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @$200 per application	$ 14,000	($200 x 70)
Additional Questions @$5,000 per application	$ 35,000	($5,000 x 7)
Preparation of EID's and EIS's	(See Summary Table)	

NOISE

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	59	1	0	0
Underground Mines	6	0	0	0
Preparation Plants	3	1	0	0
Total	68	2	0	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	2 hours
Review of alternatives analysis @ 10 hours each	0 hours
Review of EIS's @ 160 hours per EIS	0 hours
Total	2 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $200 per application	$14,000	($200 x 70)
Additional Questions @ $1,500 per application	$ 3,000	($1,500 x 2)
Preparation of EID's and EIS's	(See Summary Table)	

WETLANDS

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	45	15	2	0
Underground Mines	6	0	0	0
Preparation Plants	3	1	1	0
Total	54	16	3	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	16 hours
Review of alternatives analysis @ 10 hours each	30 hours
Review of EIS's @ 160 hours per EIS	0
Total	46 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $100 per application	$ 7,000	($100 x 70)
Additional Questions @ $1,000 per application	$ 16,000	($1,000 x 16)
Preparation of EID's and EIS's	(See Summary Table)	

ARCHAEOLOGICAL, HISTORIC AND PALEONTOLOGIC

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	40	20	5	0
Underground Mines	5	1	0	0
Preparation Plants	3	1	0	0
Total	48	22	5	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	22 hours
Review of alternatives analysis @ 10 hours each	50 hours
Review of EIS's @ 160 hours per EIS	0 hours
Total	72 hours

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire @ $600 per application	$ 42,000	($600 x 70)
Additional Questions @$1,500 per application	$ 33,000	($1,500 x 22)
Preparation of EID's and EIS's	(See Summary Table)	

PUBLIC COMMENT

APPLICATIONS TRIPPING RTC LEVELS (Annual Estimate)

	< LI	LI	LII*	LIII*
Surface Mines	50	10	0	0
Underground Mines	4	2	0	0
Preparation Plants	3	1	0	0
Total	57	13	0	0

*Applications tripping LII and/or LIII also trip LI.

USEPA MANPOWER REQUIREMENTS (Annual Estimate)

Review of Additional Questions @ 1 hour per application	13 hours
Review of alternatives analysis @ 10 hours each	0 hours
Review of EIS's @ 160 hours per EIS	0 hours
Total	13

USEPA EXPENDITURES (Annual Estimate)

EIS Costs @ $100,000 per EIS	0

EXPENDITURES BY APPLICANTS (Annual Estimate)

Initial Questionnaire	N/A
Additional Questions @ $800 per application	$10,400 ($800 x 13)
Preparation of EID's and EIS's	(See Summary Table)

SUMMARY OF USEPA AND APPLICANT COSTS

USEPA MANPOWER REQUIREMENT	
Initial Review	
Review of Additional Information	250
Review of Alternatives Analyses	153
Review of EIS's	350
Total	800
	1,553 manhours
USEPA EXPENDITURES	
EIS Preparation	
	$100,000
PERMIT APPLICANT EXPENDITURES	
Initial Information	
Additional Information	$189,000
Preparation of Alternatives Analyses	170,000
Preparation of EIS's	150,000
Total	400,000
	$909,000

APPENDIX C

GENERAL AND STANDARD PERMIT CONDITIONS

GENERAL AND STANDARD PERMIT CONDITIONS

USEPA may choose to adopt permit conditions that could be applied to numerous permit applicants. The purpose of such an action would be to establish standardized measures for mitigating coal mining impacts to environmental resources. The establishment of such conditions would provide a consistent means of regulating the effects of coal mining activities.

USEPA could choose to establish general conditions that would apply to every New Source coal facility permit applicant. A condition would be written for each resource area for which significant impacts might occur. As part of the condition, a description of when that condition would be applicable would be included. The conditions would be included in all permits and would not be related to the specific project evaluation.

Another option would be for USEPA to establish standard conditions. In contrast to the general conditions, a standard condition would be stipulated only after it has been determined that a significant adverse impact may result in a given resource area. The condition would result directly from the project review.

The use of general and/or standard conditions would provide USEPA with an expedient means of establishing consistent requirements. Project-specific data may not be available, however, to justify the stipulation of such conditions for a given project. While individual project conditions pose requirements related to the specific project, such conditions can vary greatly from project to project. General and standard conditions constitute consistent mechanisms for regulating the effects of coal mining activities. Identified below are general conditions and standard conditions that USEPA could apply to NPDES permits for New Source coal mining activities in western Kentucky.

SURFACE WATER

General Conditioning - A general condition such as the following could be used to mitigate surface water impacts by inclusion in every New Source NPDES permit:

> The applicant shall ensure that mining discharges will not adversely affect any of the following resources located within five miles downstream of proposed operations: (1) designated or proposed domestic water supplies; (2) designated or proposed coldwater aquatic habitats; (3) designated or proposed Outstanding Resource Waters of the Commonwealth (which category includes but is not limited to (a) Federally listed or proposed species in danger of extinction or threatened with endangerment, (b) Sensitive Aquatic Ecosystems identified by the Kentucky Nature Preserves Commission, and (c) high or moderate water quality streams identified by KNPC).

Standard Conditioning - A standard condition such as the following could be used to mitigate surface water impacts for those mining operations meeting or exceeding the Level I criteria.

> A surface water monitoring program will be conducted to provide water quality and quantity data sufficient to allow a detailed impact analysis on the ____(insert identified sensitive resource)____ located downstream from the mining discharge. Monitoring will be conducted at a minimum at the mining effluent discharge point(s) and at the location of the ____(insert identified sensitive resource)____. Monitoring data will be provided quarterly to EPA, Water Management Division, Region IV, to the Kentucky Department for Natural Resources and Environmental Protection (Divisions of Water and Fish and Wildlife) and the Kentucky Nature Preserves Commission. Should adverse impact be detected the applicant shall initiate measures acceptable to EPA and the Commonwealth to avoid or mitigate such impacts.

GROUNDWATER

General Conditioning - A general permit condition such as the following could be used to mitigate groundwater impacts by inclusion in every New Source NPDES permit:

> The applicant shall assure the protection of groundwater quantity and quality at public supply wells and private water supply wells.

Standard Conditioning - Standard conditions such as the following could be used to mitigate groundwater impacts for those mining operations meeting or exceeding the Level I criteria. For underground mining operations the condition would state:

> Mine seals, either dry seals or hydraulic seals, will be installed in all mine shafts which will prevent the formation of acid mine drainage.

For preparation plants and surface mines the condition could state:

> Acid forming overburden, spoil, and refuse will be isolated from oxygen contact by compaction and burial and/or by neutralization with basic material.

SENSITIVE TERRESTRIAL ECOSYSTEMS

General Conditioning - A general permit condition such as the following could be used to attempt to mitigate impacts on sensitive resources by inclusion in every New Source NPDES permit:

> The applicant shall ensure that mining operations will not adversely impact any of the following resources: (1) a Sensitive Ecosystem identified by KNPC, or (2) an area identified by KNPC as likely to be inhabited by a Federally listed or proposed species in danger of extinction or threatened with endangerment as designated by USFWS.

Standard Conditioning - A standard condition such as the following could be used to mitigate impacts for those mining operations meeting or exceeding the Level I criteria:

> The applicant shall establish buffer zones around Sensitive Ecosystems. Where ecosystems cannot be buffered from adverse mining impacts, mining activities shall be relocated. Mining activities shall be phased to minimize adverse impacts to nearby ecosystems and revegetation on-site shall follow SMCRA procedures. A monitoring program will be conducted to provide data sufficient to allow a detailed impact analysis. Monitoring data will be provided quarterly to EPA, Water Management Division, Region IV, and to the Kentucky Nature Preserves Commission. Should adverse impacts be detected, the applicant shall initiate measures acceptable to EPA and KNPC to avoid or mitigate such impacts.

WETLANDS

General Conditioning - A general permit condition such as the following could be used to mitigate impacts to wetlands by inclusion in every NPDES permit:

> The applicant shall ensure that mining operations will not adversely affect wetlands located on or adjacent to the permit area.

Standard Conditioning - A standard condition such as the following could be used to mitigate impacts for those mining operations meeting or exceeding the Level I criteria.

> The applicant shall establish buffer zones to separate mining activities from identified wetland areas. Water quality in wetlands shall be protected by the applicant maintaining natural groundwater flow rates and preventing any discharge of degraded water into the wetland area.

ENVIRONMENTALLY SIGNIFICANT AGRICULTURAL LANDS

General Conditioning - A general permit condition such as the following could be used to mitigate impacts on the natural soils by inclusion in every New Source NPDES permit for surface mining:

> The applicant shall ensure that prime farmlands proposed for surface mining are reclaimed through soil removal, stockpiling, and replacement according to SMCRA procedures.

Standard Conditioning - A standard condition such as the following could be used to mitigate impacts for those surface mining operations meeting or exceeding the Level I criteria.

> Surface mining and reclamation operations shall meet the requirements for soil removal, stockpiling, and replacement described on the attached sheet for prime farmlands (whether or not cultivated in the previous ten years), unique farmlands, and farmlands of statewide or local importance. (NOTE: The sheet attached to the permit would outline the four steps required for soil removal, storage, and replacing.)

RECREATION LANDS

General Conditioning - A general permit condition such as the following could be used to mitigate impacts to recreation lands by inclusion in every New Source NPDES permit:

> Mining activities shall be located or phased so that impacts to adjacent recreational land, such as high noise levels, dust emissions, and visual effects, will be minimized to the nonintrusive levels.

Standard Conditioning - A standard condition, such as the following, could be used to mitigate impacts for those mining operations meeting or exceeding the Level I criteria. The standard condition could state:

> The applicant shall construct barriers, use natural topographic features as barriers, or redefine the mining boundary area to minimize mining and/or visual impacts on recreational land. Mining and related activities shall be staged to minimize the adverse effects on adjacent recreational land. Where appropriate, haul routes shall be relocated to avoid impacts on recreational land.

AIR QUALITY

General Conditioning - A general permit condition such as the following could be used to attempt to mitigate fugitive dust impacts by inclusion in every New Source NPDES permit:

> The applicant shall utilize fugitive dust control measures on unpaved public and private haul roads to assure air quality at sensitive receptors does not exceed NAAQS particulate limits.

Standard Conditioning - A standard condition such as the following could be used to mitigate air quality impacts for those operations meeting or exceeding Level I criteria. The standard condition could state:

> Unpaved off-site haul roads adjacent to identified sensitive receptors shall be periodically watered, chemically stabilized, or paved, at the applicant's option, to minimize fugitive dust emissions and to ensure National Ambient Air Quality Standards are not exceeded at the receptor due to project operations.

NOISE

General Conditioning - A general permit condition such as the following could be used to attempt to mitigate noise impacts by inclusion in every New Source NPDES permit:

> The applicant shall ensure that noise levels at sensitive receptors to the mining operation and near coal transportation routes are less than 70 dBA $L_{eq}(24)$.

Standard Conditioning - A standard condition such as the following could be used to mitigate impacts for those mining operations meeting or exceeding the Level I criteria. For coal preparation plants located within 200 feet of a sensitive receptor (and therefore likely to cause noise levels equal to or greater than 70 dBA), the condition could state:

> All coal haul trucks shall have muffler systems installed and maintained for proper operation. Where practicable, transportation routes will be altered to avoid sensitive receptors, and nighttime coal hauling will be avoided where sensitive receptors are located and an L_{dn} of 73 dBA is projected.

For coal transportation routes where sensitive receptors would be expected to receive a noise level of 70 dBA, the condition would state:

> All coal haul trucks shall have muffler systems installed and maintained for proper operation. Where practicable, transportation routes will be altered to avoid as many sensitive receptors, and nighttime coal hauling will be avoided where sensitive receptors are located and an L_{dn} of 73 dBA is projected.

ARCHAEOLOGIC, HISTORIC AND PALEONTOLOGIC RESOURCES

General Conditioning - A general condition such as the following could be used to mitigate impacts by inclusion in every New Source NPDES permit:

> At least forty-five (45) days prior to initiation of new mining activities on undisturbed portions of the permit area, the applicant shall provide a professional reconnaissance survey addressing whether buildings or sites eligible for inclusion in the National Register of Historic Places may be present and affected to the State Historic Preservation Officer (SHPO)

and EPA. Should any such eligible sites be located, completion of the consultation requirements pursuant to Section 106 of the National Historic Preservation Act shall be accomplished prior to initiation of mining affecting such sites.

Standard Conditioning - A standard condition such as the following could be used to mitigate impacts for those mining operations where the SHPO or OSA indicates that the proposed operation will impact a historic, archaeologic, or paleontologic resource (i.e., Level I is triggered).

> Mining and construction activities will be rerouted to avoid the identified historic, archaeologic, or paleontologic site(s). During construction, monitoring of the historic site will be conducted periodically to ensure that deterioration does not occur. All monitoring reports will be forwarded to the State Historic Preservation Officer.

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